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Article XLII.—*On the Medicinal Leeches. By D. B. Smith.*

The great and increasing use of leeches in the healing art, has given an importance to this aquatic worm, which is possessed by few animals so low in the scale of being.

The annual consumption of Paris alone is estimated at more than three millions of leeches, and the neighbouring departments being exhausted of their supply, the north and the south of France, Italy, Spain, Corsica, and Germany, even to the frontiers of Turkey, are explored by the dealers in leeches.

The species most commonly used in Europe is the gray and green leech, which are mere varieties of the *Hirudo medicinalis* of Linnæus. They have been separated into two species by modern naturalists, and Savigny has divided the genus *Hirudo* of Linnæus into several genera, and classed the medicinal leeches together under the name of *Sanguisuga*.

The officinal European leech varies much in its markings

and size. The belly is of a greenish olive irregularly marked with black, or having two broad irregular marginal longitudinal black stripes. The back is of a darker green or gray colour, and marked with six longitudinal bands, more or less continuous, of which the four outer ones are black, and the two inner, or central ones, of a light olive colour: sometimes there are but four of these bands, which are occasionally replaced by rows of black spots.

The first and second figures of the plate are drawn from an individual of this variety of the green leech.

The leech may be considered as an elastic extensible tube composed of a series of muscular rings. The stomach extends throughout its whole length, and the very curious jaws of the leech are situated at its anterior end. These jaws are three lens-shaped bodies (A, fig. 3) placed in the folds of the mouth. A sphincter muscle (B) beneath them draws the lower ends of these jaws together by its contraction, so as to make the triangular incision peculiar to the bite of the leech. These jaws are armed along their edge with sharp teeth, of which there are sixty or seventy in each jaw.

Our fourth and fifth figure represent the medicinal leech of America, the *Hirudo decora* of Say, which is here figured for the first time.

With the permission of the authors, we transcribe from the Dispensatory of the United States, the article *Leech* of that valuable and important work.

"Hirudo Medicinalis. *Dub. The Leech.* Sangsue, *Fr.;* Blutegel, *Germ.;* Mignatta, *Ital.;* Sanguijuela, *Span.*

"Hirudo. *Class* 1, Annelides. *Order* 3, Abranchiatæ. *Family* 2, Asetigera. *Cuvier.*

"The leech belongs to that class of invertebrated articulated animals called Annelides. This class contains the worms with red blood, having soft retractile bodies composed of numerous segments or rings, breathing generally by means of branchiæ, with a nervous system consisting in a double knotted cord, destitute of feet, and supplying their place by the con-

tractile power of their segments or rings. The third order of this class—ABRANCHIATÆ, comprehends those worms which have no apparent external organ of respiration. This order is again divided into two families, to the second of which—the ASETIGERÆ, or those not having setæ to enable them to crawl —the leech belongs.

"It is an aquatic worm with a flattened body, tapering towards each end, and terminating in circular flattened discs, the hinder one being the larger of the two. It swims with a vertical undulating motion, and moves when out of the water by means of these discs or suckers, fastening itself first by one and then by the other, and alternately stretching out and contracting its body. The mouth is placed in the centre of the anterior disc, and is furnished with three cartilaginous lens-shaped jaws at the entrance of the alimentary canal. These jaws are lined at their edges with fine sharp teeth, and meet so as to make a triangular incision in the flesh. The head is furnished with small raised points, supposed by some to be eyes. Respiration is carried on through small apertures ranged along the inferior surface. Its nervous system consists of a cord extending the whole length, furnished with numerous ganglions. The intestinal canal is straight and terminates in the anus, near the posterior disc. Although hermaphrodite, leeches mutually impregnate each other. They are oviparous, and the eggs, varying from six to fifteen, are contained in a sort of spongy, slimy cocoon, from half an inch to an inch in diameter. These are deposited near the edge of the water, and hatched by the heat of the sun. The leech is torpid during the winter, and casts off from time to time a thick slimy coating from its skin. It can live a considerable time in sphagnous moss, or in moistened earth, and is frequently transported in this manner to great distances by the dealers.

"Savigny has divided the genus *Hirudo* of Linnæus into several genera. The true leech is the *Sanguisuga* of this author, and is characterised by its three lenticular jaws, each armed with two rows of teeth, and by having ten ocular points.

"Several species are used for medicinal purposes, of which the most common are the gray and the green leech of Europe, both of which are varieties of the *Hirudo medicinalis* of Linnæus; and the *Hirudo decora* of this country.

"1. *Hirudo medicinalis*, Linn. *ed. Gmel.* I, 3095. *Sanguisuga officinalis*, Savigny. Moq. Tandon, Mon. Hir. p. 112, t. 5, f. 1. *The green leech.*—*Sanguisuga medicinalis*, Savigny. Moq. Tandon. Mon. Hir. p. 114, t. 5, f. 2. *The gray leech.*

"Many of the best zoologists regard the *S. officinalis* and *S. medicinalis* of Savigny as mere varieties. They are both marked with six longitudinal dorsal ferruginous stripes, the four lateral ones being interrupted or tesselated with black spots. The colour of the back varies from a blackish to a grayish-green. The belly in the first variety is of a yellowish-green colour, free from spots, and bordered with longitudinal black stripes. In the second it is of a green colour, bordered and maculated with black. This leech varies from two to three or four inches in length. It inhabits marshes and running streams, and is found abundantly throughout Europe.

"The great use made of leeches in the modern practice of medicine, has occasioned them to become a considerable article of commerce. They are collected in Spain, France, Italy, and Germany, and exported in large numbers to London and Paris. They are also frequently brought to this country, as the practitioners in some of our large cities use only the foreign leech, although our own waters furnish an inexhaustible supply of this useful worm.

"2. *Hirudo decora*. (Say—*Major Long's Second Expedition*, ii. 268.)—The medicinal leech of America has been described by Say under the name of *Hirudo decora*, in the appendix to the second expedition of Major Long. Its back is of a deep pistachio green colour, with three longitudinal rows of square spots. These spots are placed on every fifth ring, and are twenty-two in number. The lateral rows of spots are black, and the middle range of a light brownish orange colour.

The belly is of the same colour, variously and irregularly spotted with black.

"The American leech sometimes attains the length of four or five inches, although its usual length is from two to three. It does not make so large and deep an incision as the European leech, and is generally supposed to draw less blood. The quantity which a single full-grown native leech will draw varies from two to three drachms, but those of the largest size, we have been assured, will extract as much blood as the best foreign leech.

"The use of the indigenous leech is nearly restricted to the city of Philadelphia. The practitioners of New York and Boston depend for their supplies upon foreign countries, and leeching is seldom resorted to in the southern or western states. Those which are used in Philadelphia are generally brought from Bucks and Berks county in Pennsylvania, and occasionally from other parts of the state. It is estimated that from 200 to 250,000 are annually consumed.

"The proper preservation of leeches is an object of importance to the practitioner, as they are liable to great and sudden mortality. They are usually kept in jars in clear water, which should be changed twice or three times a week. The jar must be covered with a linen cloth, and placed in a situation not liable to sudden changes of temperature. They will live a long time, and continue active and healthy, without any other attention than that of frequently changing the water in which they are kept. M. Derheims has proposed the following excellent method of preserving them. In the bottom of a large basin or trough of marble he places a bed six or seven inches deep, of a mixture of moss, turf, and fragments of wood. He strews pebbles above, so as to retain them in their place without compressing them too much, or preventing the water from freely penetrating them. At one end of the trough, and about mid-way of its height, is placed a thin slab of marble or earthenware, pierced with numerous holes and covered with a bed of moss, which is compressed by a thick layer of pebbles.

The reservoir being thus disposed is half filled with water, so that the moss and pebbles on the shelf shall be kept constantly moist. The basin is protected from the light by a linen cover stretched over it. By this arrangement the natural habits of the leech are not counteracted. One of these habits, essential to its health, is that of drawing itself through the moss and roots to clear its body from the slimy coat which forms on its skin, and is a principal cause of its disease and death.

"*Medical Uses.*—Leeches afford the least painful, and in many instances the most effectual means for the local abstraction of blood. They are often applicable to parts which, either from their situation, or their great tenderness when inflamed, do not admit of the use of cups; and in the cases of infants, are, under all circumstances, preferable to this instrument. They are indeed a powerful therapeutic agent, and give to the physician, in many instances, a control over disease which he could obtain in no other way. Their use is in great measure restricted to the treatment of local inflammations; and, as a general rule, they should not be resorted to until the force of the circulation has been diminished by bleeding from the arm, or in the natural progress of the complaint.

"In applying leeches to the skin, care should be taken to shave of the hair, if there be any, and to have the part well cleansed with soap and water, and afterwards with pure water. If the leech does not bite readily, the skin should be moistened with a little blood, or milk and water. Sometimes the leech is put into a large quill open at both ends, and applied with the head to the skin until it fastens itself, when the quill is withdrawn. Leeches continue to draw blood until they are gorged, when they drop off. The quantity of blood which they abstract varies according to the part to which they are applied, and the degree of inflammation existing in it. In the loose and vascular textures they will abstract more than in those which are firm and compact, and more from an inflamed than a healthy part. As a general rule, our leechers apply six for every fluid ounce of blood. A single European leech will draw from half

an ounce to an ounce. The quantity may often be much increased by bathing the bite with warm water. Leeches will continue to suck after their tails are cut off, which is sometimes done, although it is a barbarous practice. They may be separated from the skin at any time by sprinkling a little salt upon them. After they drop off, the same application will make them disgorge the blood they have swallowed. Some leechers draw the leeches from the tail to the head through their fingers, and thus squeeze out the blood, after which all that is necessary is to put them in clean water and change it frequently. Leeches which are gorged with blood should be kept in a vessel by themselves, as they are more subject to disease, and often occasion a great mortality among the others; and they should not be again used until they have recovered their activity.

"In cases where the bleeding from leech-bites continues longer than is desirable, it may be stopped by continued pressure, with the application of lint, or by touching the wounds with lunar caustic. It may sometimes be necessary, in the case of a deep bite, to sew the wound, which is readily done with a single stitch of the needle, that need not penetrate deeper than the cutis."

Article XLIII.—*On the Chlorides of Oxides. By E. Durand.*

[In reply to Article XXXI. page 205.]

My object in compiling the article upon the chlorides of oxides, which appeared in the first volume of this Journal, was to promote a knowledge of these useful compounds, and of their various employments, which were then but very im-

perfectly known in this country, especially as disinfecters. In order to bring my subject to the level of the science, I procured almost all the latest European publications; but the want of time, the fear of delaying the publication of the number, together with the circumstance of not having an opportunity of correcting the proofs myself, were the causes of the mistatement pointed out by Mr Cohen, and of the accidental insertion of the obnoxious sentence which has elicited his censure.

I have to apologize to Mr Faraday for having thus, inadvertently, attributed to him the error of Mr Philips, and, at the same time, to assure those who are in possession of the essay in question, that the whole sentence quoted by Mr Cohen, would, if seen in time, have been expunged, as belonging to notes written in the course of my investigation of the subject, but afterwards rejected. Its misplacement, uselessness and inconsistency are obvious. In other respects, I feel confident that I have represented faithfully the experiments and opinions of Mr Faraday upon Labarraque's liquid.

As to the points on which Mr Cohen entertains opinions different from those I advocated three years ago, I confess I could not then avail myself of the discoveries which have since been made; with regard to some, I have materially altered my sentiments; but upon others, I still dissent considerably from that gentleman.

The chlorides of oxides, although the subject of much inquiry and controversy, are not much better known at present than they were three years ago. Several eminent chemists persist in considering them as a simple combination of chlorine with a metallic base; others, with Berzelius, Liebig, and Dumas at their head, regard them as a mixture of a metallic chloride with a chlorite of an oxide; but whatever may be their composition, they are all acknowledged to be indebted for their essential properties to the presence of chlorine; they all possess a bleaching and disinfecting power proportionate to the quantity of this gas which they are capable of evolving; hence, it

would be absurd to suppose that Labarraque's liquid is preferable to any other, since a fresh solution of one part of common bleaching salt and twelve or fifteen of water can yield as much, if not more chlorine, at a cheaper rate.

The views to which Mr Gaultier de Claubry was led by his experiments upon the manner in which the chloride of lime is decomposed by the carbonic acid of a vitiated atmosphere, are too well established, and sanctioned by too many authorities, to be easily overturned by the opinions of Mr Cohen, founded as they are upon a single unsuccessful experiment. Gaultier's theory is advocated by almost all the modern writers upon chemistry, is opposed by none, and by some is even extended to all the chlorides of oxides, without distinction of base. If Mr Cohen has exposed, for a whole month, to the atmospheric influence, a filtered solution of chloride of lime, without perceiving a pellicle on the surface of the liquid, or a precipitation at the bottom of the vessel, it was probably because he chose for the experiment a peculiar atmosphere free from carbonic acid; or, rather, because the chloride employed by him had already undergone decomposition. An atmosphere vitiated by miasmata, always contains a large proportion of carbonic acid: in fact, what happens during the putrefaction of organic bodies? In that condition, these substances absorb a considerable quantity of the oxygen of the air; but, at the same time, they evolve a volume of carbonic acid equal to that of the former gas. The same phenomenon takes place also during respiration. A foul air will, of course, act more powerfully towards the decomposition of a chloride of an oxide than a pure atmosphere.

I have frequently repeated the experiment of Mr Cohen, but always with a different result. Let any one try it for his own satisfaction, with a solution recently made from a good chloride, in a heated room or in a vitiated atmosphere, and he will arrive at the same conclusion. On breaking the first pellicle, it sinks to the bottom of the vessel, and a new one is genera-

ted. When the liquid has been evaporated almost to dryness, by successively breaking the pellicles as they form, let some water be poured upon the residue, in order to separate the chloride of calcium and chlorate of lime which are generated at the same time, or existed previously in the solution, throw the whole upon a filter, wash well and dry in the air, the residue will prove to be a pure carbonate of lime.

The identity of the impure chloride of soda, prepared according to Labarraque's formula, with that obtained by the more simple process of Payen, has been also admitted by all the authorities; and Mr Cohen will deserve great credit if he succeeds in proving the contrary. If he will take the trouble of considering the basis upon which Payen establishes this identity, he will, I am sure, find reasons for changing his opinions before proceeding any farther.

Payen first ascertained the mean proportion of chlorine contained in Labarraque's solution, and compared it with the proportion of this gas in chloride of lime of 98° of Gay Lussac's chlorometer. The result of his experiments was, first, that one part by weight of this chloride is equivalent to twenty parts of Labarraque's liquid; second, that one hundred parts of chloride of lime are completely decomposed by one hundred and thirty-eight parts of crystallized carbonate of soda; and, lastly, that sixty-eight parts more of this salt, added to the neutral solution of the chloride, are sufficient to render the compound as permanent as Labarraque's. The whole difference between these two preparations consists, then, in the larger proportion of carbonate of soda contained in the latter solution; a circumstance accounting for its greater specific gravity; but the specific gravity of these chlorides has nothing to do with their essential properties. I have experimented much upon these different preparations, and my opinion is very decided as regards their relative value; the formula of Payen, strictly adhered to, will always lead to an uniform preparation, equal in every respect to that obtained by Labarraque's process.

By reducing to one half the proportions of water employed in the solutions of chloride of lime and of carbonate of soda, a highly concentrated chloride of soda, marking 12° of Baumé's areometer, is obtained, very superior to the common disinfecting liquid.

Both Payen and Labarraque's solutions are equally permanent, although subject to slow decomposition; when evaporated to dryness, the results are the same; no chlorine is evolved during evaporation; the saline mass obtained preserves the odour peculiar to the original liquid; redissolved in water, its bleaching power is still very great, and it yields, as an ultimate result, a bicarbonate of soda mixed with a small quantity of chloride of sodium.

It is very true, that the employment of sulphate of indigo for ascertaining the strength of the chlorides of oxides, i. e. the relative proportion of chlorine they contain in each specimen, may occasion many inaccuracies; but such as it is, I consider it yet as constituting the only good method we have for testing the impure chlorides of soda. Morin's chlorometer, established upon the decomposition of the chloride of lime by means of the chloride of manganese, is not adaptable to the solution of Labarraque. Marozeau's, founded upon the solubility of bichloride of mercury, generated by the action of the chlorine (evolved from a solution of a neutral chloride of an oxide by means of an acid) upon the simple chloride of that metal, requires modifications, before it can become useful in enabling us to compare the strength of mixtures of a chloride of an oxide and a carbonate, because both chlorine and carbonic acid are evolved at the same time. It must be confessed, however, that some means or other must be resorted to for the purpose of ascertaining the strength of these compounds. Repeated trials with a solution of indigo, proper management, and a certain degree of experience with the various shades produced in these solutions by the addition of a solution of a chloride of an oxide, will enable any one to acquire a great accuracy in ascertaining the power of the impure chlorides of

soda. Morni's and Marozeau's chlorometers are merely intended for the chloride of lime, an article of much more importance to the arts and to medicine than the liquid under consideration.

Article XLIV.—*On the Vegetable Emetics of the United States. By R. Eglesfeld Griffith, M.D.*

In a former number, when noticing those South American plants to which the name of Ipecacuanha has been indiscriminately applied, we stated that it was our intention to give a corresponding sketch of those native vegetables which are said to be possessed of emetic properties. The following notes are an attempt to redeem that pledge, and though exceedingly imperfect, contain, we believe, the sum of our knowledge respecting this interesting portion of our materia medica. In presenting them to our readers we have followed in their arrangement that adopted by M. Lemaire Lisancourt in his "Memoir on Vegetable Substances employed in Medicine, and known in commerce under the name of Ipecacuanha," except that we have made use of the natural orders as given by Professor Lindley, instead of those of Richard, whose classification is adopted by M. Lisancourt. We have been induced to pursue this plan, from the circumstance of the republication of Professor Lindley's learned and truly excellent work in this country, and the great probability that exists of its becoming the general text book, whilst, on the contrary, the treatise of his co-labourer in science is scarcely known, even by name, except to those who have made some progress in their botanical acquirements. The study of the natural orders and affinities has been too much overlooked in the United States, and

although we do not regard this system as accomplishing the views of its votaries, it cannot be denied that it has shed lights on the science which could never have been diffused by that of the Swedish naturalist.

It is not till we arrive at the third class or RANUNCULACEÆ, that we find any plants possessed of emetic qualities, those belonging to the ARALIACEÆ and UMBELLIFERÆ for the most part being endowed with antispasmodic or narcotic properties. Many of the third class, however, are violent stimulants, and capable at the same time of inducing emesis. The roots of several species of *Ranunculus*, as the *bulbosus*, *acris*, *flammula*, &c. are so acrid in their fresh state as to be used as epispastics; this caustic principle, however, like that of the *Arum triphyllum*, is so volatile as to be destroyed by almost every agent; the mere process of drying being capable of destroying it. Very few plants of the class PAPAVERACEÆ are distinguished for their emetic powers, and of those indigenous to the United States two only require notice, the *Sanguinaria Canadensis* and the *Argemone Mexicana*. The root of the first of these, of which a full account has been given in a former number of this Journal, is a powerful emetic in doses of from ten to fifteen grains; it requires great caution in its administration, and is seldom employed for this purpose. Of the *Argemone Mexicana* we know but little as respects its medical qualities, though it is said that the seeds are used in the West Indies as a substitute for Ipecacuanha, and Ainslie states that the Hindoo doctors consider the juice as a valuable remedy in ophthalmia.

As far as is known, no native vegetable belonging to any of the classes from the fourth to the sixty-second is endowed with emetic powers, with the exception of the eighteenth or the CALYCANTHEÆ, and this is doubtful; it is however stated that the bark of the root of the *Calycanthus Florida* will produce violent vomiting; if so, it is a strange anomaly, as the bark of the stem is a pleasant aromatic. In the sixty-second class or the ARISTOLOCHIÆ are found the *Asarum* and *Aristolochia*, which we here notice to correct some erroneous statements

which have been promulgated respecting them. Thus M. Lisancourt states that the *Aristolochia serpentaria* is much used in the United States as an emetic, quoting Chapman as his authority. Now this writer states just the reverse, properly observing that "it is rarely offensive to the stomach" and "is suited to check vomiting and tranquillize the stomach." The *Asarum Canadense*, although closely resembling its European congener in form, does not appear to possess the emetic qualities of that plant; on the contrary, it is a warm and aromatic stimulant. The emetic powers attributed to its leaves are, as is suggested by Barton, in all probability owing to the quantity taken, rather than to their inherent activity. The sixty-fifth class, THYMELÆÆ, is strongly characterized by the causticity of the bark of almost all the species belonging to it; this is strongly marked in the only one of the order indigenous to this country, the *Dirca palustris*, the fresh root and bark of which will vesicate the skin in about twenty-four hours. They have also been resorted to as emetics in the dose of five or ten grains, but from their acid character, this practice is unsafe, and liable to unpleasant results.

The order of ROSACEÆ affords a striking proof, that however natural may be the classification of plants, it is by no means a certain criterion of uniformity of remedial properties; thus this beautiful class includes species of the most opposite powers, for whilst the generality of them are astringent, others possess diametrically opposite virtues; the *Brayera anthelmintica* is one of the most powerful anthelmintics hitherto discovered, and the genus *Gillenia* furnishes one of the best substitutes for Ipecacuanha, if general opinion is to be received as evidence of truth; some doubts, however, of the powers of this remedy have lately been entertained, and the subject requires a thorough investigation; in our last number having dwelt on this point at some length, it would be useless to repeat the arguments in this place.*

* Vid. Journ. Pharm. Vol. IV. p. 177, et seq.

The extensive and splendid family of LEGUMINOSÆ presents among the species included in it, almost every variety of medicinal power, among which that of producing emesis is by no means the most rare, though this is not the case as regards our native species, of which only two have been reported to be endowed with vomitive qualities. The *Baptisia tinctoria*, says Dr Thatcher, "in the hands of some physicans is found to operate in a large dose, with much severity as an emetic and cathartic;" from trials, however, made by Dr W. P. C. Barton, it appears that in doses of twenty or thirty grains no such results are to be obtained, but as an external application to ulcers, &c. there is the most unequivocal testimony of its beneficial qualities. The inner bark, and especially of the root of the *Robinia pseudacacia*, which is sweetish, is also used by the Indian doctors, as they are termed, to fulfil a variety of indications; in large doses it is said to produce a full emetic effect.

Among the MYRICEÆ, the only species that we are called upon to notice is the *Myrica cerifera*, a plant of no inconsiderable medicinal utility. The bark of the root is spoken of by some practitioners in the highest terms as a safe and effectual emetic. Among the rest, Dr James Mann, who gave it a fair trial, thinks that it is equal in strength to Ipecacuanha.

The next class, or JUGLANDEÆ, furnishes no species possessed of emetic properties, but its successor, or the EUPHORBIACEÆ, abounds in them, in fact, almost every plant belonging to this great class appears to be endowed with some active quality. The genus *Euphorbia* itself is by no means the least distinguished among them, almost every species having medicinal qualities of a very decided character. It would lead us into too great detail and deviate too much from the intention of these notes to advert to any of these species, except to those peculiar to this country; the fullest information, however, on this subject may be obtained from the learned monograph of M. Adrien de Jussieu and the more condensed though admirable account of Professor Lindley; it may be generally stated,

however, that all the species are endowed with analogous properties, which are energetic in proportion to the warmth of the climate in which they are found. All parts of the plant possess these active qualities, the juice, and especially that of the roots of the perennial species, being acrid and emetic, whilst the seeds afford a purgative oil. The native species which have most strongly attracted attention are the *E. ipecacuanha* and *E. corollata*, though there can be little doubt but that other species, as the *E. marginata* and *E. cyathophora* are equally deserving of investigation. The root of the *E. ipecacuanha* is a safe and efficient emetic, when given in the same doses as the true Ipecacuanha, and has been substituted for it with unequivocal success. According to Dr W. P. C. Barton, its various compounds, as Dover's powder, &c. are fully equal to those made with the foreign root. The *E. corollata* appears, however, to be preferable in many respects to the preceding, one of which, and not the least important, is the fact of its possessing no unpleasant taste, it is certain and mild in its operation, and acts as a purgative when it fails in exciting a discharge from the stomach. The dose is from fifteen to twenty grains, but as with Ipecacuanha, it may be increased without producing any unpleasant effects. The medical profession are principally indebted to Dr Zollickoffer for investigations into the real value of this plant; in his opinion, it is equal to the *Cephælis*, and he adds, what is seldom the case with medicinal roots of the emetic class, that its virtues are very little impaired by boiling.

The order CELASTINEÆ has not been sufficiently investigated to enable us to say any thing definite with regard to the general properties of the plants composing it. A native species, however, the *Celastrus scandens* is made use of by empirics to fulfil various indications, among which is that of producing emesis, and in all probability is the plant alluded to by Dr B. S. Barton, who states that it was much used among the Indians; the part used is the bark; a great objection to its use is the largeness of the dose required to produce the intended effect.

The order of the POLYGALEÆ contains many plants of decided, but opposite powers, though a bitterness in the leaves and milk of the root are their most general characteristics. In the genus *Polygala*, many of the species are eminently emetic, particularly the *P. glandulosa*, a native of China, which is held in the highest estimation in that country as a panacea; the *P. poaya*, recently described by Dr Martius, and of which we gave a short account in a former paper, is also an excellent substitute for the true Ipecacuanha. Neither are some of the North American species destitute of this quality, the *P. senega* is a well known and deservedly esteemed article of the materia medica, and though it is seldom employed merely with reference to its vomitive powers, except in cases of children, and in a compound form, it holds an important place among the emetic medicines; another native species, the *P. sanguinea*, is also stated to be endowed with similar qualities, though not in an equal degree.

In the great family of the VIOLACEÆ: all the species appear to be more or less possessed of emetic properties, more especially those which are natives of warm climates. The genus *Viola* has not been sufficiently investigated as regards its medical powers to enable us to assign to it its true rank; from the researches of M. Boullay on the *V. odorata*, it appears that if the active properties of this plant are owing to the presence of a peculiar principle, resembling Emetine, and which he terms Violine, it is most probable, from the acrid and nauseous taste of several of our native species, that they would prove eminently emetic, this is particularly the case in the *V. cucullalata* and *V. primulifolia;* these plants deserve a thorough investigation of their powers.

The small order of PHYTOLACCEÆ furnishes a very important addition to our emetic roots, in that of the *Phytolacca decandra*, which, notwithstanding the eulogies bestowed upon it by several distinguished and competent observers, has been much neglected by our medical men. Professor Bigelow observes of it, that "in its medicinal properties, the root of the

P. decandra approaches nearer to Ipecacuanha than any American vegetable I have hitherto discovered," "when properly prepared, it operates in the same doses and with the same certainty as the South American emetic." The medical virtues of this plant are not confined to its powers as an emetic, as Dr Zollickoffer states that he has found the juice of the berries of great efficacy in the cure of chronic rheumatism.

Among the species composing the class of ILICINEÆ the utmost discrepancy of properties is to be recognized, for whilst the *Ilex Paraguensis* yields an almost indispensable beverage to the inhabitants of a large portion of South America, and the *Prinos verticillatus* is eminently tonic and astringent, other species furnish the most active emetics; this is peculiarly the case with some which are indigenous to this country; thus the *Ilex cassine*, Michaux (*I. vomitoria, Lin.*) and the *I. dahoon*, Michaux (*I. cassine, Lin.*), are possessed of strongly marked emetic qualities, and form the principal ingredient of the black drink of the southern Indians, used before commencing their religious rites and great councils. Rafinesque states, that other plants of this class are also used for this purpose, as the *C. ramulosa*. The above-mentioned species of Ilex are, however, but seldom made use of as emetics by physicians, from being very uncertain in their effects.

The class of LOBELIACEÆ presents a rare instance of uniformity of properties in the species composing it; they are all active and dangerous from the great acridity of their juices; this is particularly the case as respects the genus *Lobelia*, one species of which, the *L. longiflora*, a native of some of the West India islands, is stated by Lindley to be one of the most venomous of plants. When taken internally, it causes such violent irritation of the bowels, that no treatment can arrest the discharges, which generally end in death. Closely allied to this in virulence is the *L. inflata*, a native plant, which, unfortunately for humanity, is too universally known to the most of empirics infesting our country. No one of the vegetable productions of the United States requires more caution in its employ-

ment; its operation as an emetic is speedy, violent and durable, succeeded by a general relaxation and debility of the vital powers, and in more than one instance, by death. At the same time, like all other heroic remedies, it has proved eminently successful in the hands of skilful practitioners, though from the circumstance above alluded to, the good has never been commensurate to the evil.

In the immense class of COMPOSITÆ, but few real emetics are found, though some of the species are resorted to for this purpose in the form of a warm decoction, when in all probability the quantity of warm water taken, aided by the stimulating properties of the vegetable, produce the intended effect. The most celebrated of these are the *Eupatorium perfoliatum*, which, whatever may be its true value as an emetic, is of indisputable utility, both as a diaphoretic and a tonic, which properties it enjoys with several of its congeners. The *Anthemis cotula*, has also enjoyed considerable reputation as an emetic and diaphoretic, but is far more unpleasant and less efficacious than the *Anthemis nobilis*.

The ASCLEPIADEÆ are generally acrid and stimulating plants, and hence possessed in some instances of emetic qualities; those peculiar to the United States have, however, received too little attention to enable us to speak with certainty as to their true powers. The *Asclepias incarnata* has been employed by several physicians, who speak of it as a useful emetic and cathartic, and from information we have received, it would appear that the *A. syriaca*, *A. obtusifolia*, &c. are also entitled to notice in this respect.

Much more, however, is to be expected from the APOCYNEÆ, which are endowed with higher powers, as is instanced in the different species of *Strychnos*. Among those which are indigenous to the United States, the *Apocynum androsæmifolium* has attracted the most notice, though it is more than probable, that all our native species of this genus possess analogous powers. The powdered root of this plant proves a safe and effectual emetic in doses of thirty or forty grains, rarely

producing any of the unpleasant effects so common after the administration of many of our native remedies of the emetic class. There is one great disadvantage attendant on the use of this plant: the root must be used soon after it is gathered, as its powers are considerably impaired, and even destroyed, by keeping. It is also extremely nauseous and bitter, and therefore is not likely to come into general use.

The SCROPHULARINEÆ are, in most cases, acrid plants, some of which have been used as emetics. The *Gratiola officinalis* of Europe acts as an emeto-cathartic, and in all probability its closely allied native congener, the *G. aurea*, is possessed of the same qualities. The different species of *Leptandra* have also obtained some celebrity among the Indian or botanical doctors, as emetics and cathartics; they are violent in their action, and repulsively nauseous, and will therefore be little likely to be adopted in regular practice.

The class SOLANEÆ abounds in active and dangerous plants, whilst at the same time it furnishes the most important article of vegetable food known to man—furnishing thousands with their only means of subsistence. Not the least celebrated of its species is the *Nicotiana tabacum*, a plant whose emetic powers are of a very high order, though the violence of its action prevents it from being often employed internally. As an external application, however, it is frequently resorted to, where the most speedy evacuation of the stomach is required, as in cases of poisoning, &c. In croup, also, the late Dr Godman found it extremely efficacious, applied to the outside of the throat, inducing vomiting and a relaxation of the spasmodic contraction of the glottis, when all other means had failed.

The medicinal properties of the plants composing the class BIGNONIACEÆ, are but little known; it is, however, stated by Rafinesque, we know not on what authority, that the wood of the *Catalpa cordata* is possessed of emetic qualities, and another closely allied plant, inhabiting South America, the *Bignonia copaia*, according to Aublet, is eminently emetico-cathartic.

The VERBENACEÆ are of little importance in a medical point of view. The *Verbena hastata* is said to be emetic, and is made use of by empirics, some of whom esteem it as nearly equal to their great panacea, the *Lobelia inflata.*

The Monocotyledonous plants present but few orders possessed of active qualities, among which the AMARYLLIDEÆ are confessedly the most important. The plants of this order all contain a peculiar principle, which is thought by Decandolle to be analogous to that of the squill. The roots of the *Pancratium maritimum*, and perhaps those of the other native species, are possessed of emetic properties when fresh, which almost disappears when they are in a dried state. Some years since a quantity of them were sold in this city for those of the squill, but proved almost inert.

The roots of some of the IRIDEÆ are emetico-cathartic, and have been used for that purpose. The juice of the roots of the *Iris versicolor*, &c. sometimes acts violently even in small doses. M. Thouery thought he discovered emetine in the root of the *Iris Florentina*, which would explain the source of the active qualities of these plants; his discovery, however, has not been confirmed. Vogel also examined this species, but with different results.

The MELANTHACEÆ are almost universally poisonous, and this character is marked in no species more strongly than in the *Veratrum viride*, a native plant of considerable powers as an emetic, requiring great caution in its administration; it acts tardily in discharging the contents of the stomach, and has the further disadvantage of almost invariably causing unpleasant general effects. It owes its power to the presence of a peculiar principle termed Veratrine, which is also found in the *Colchicum.* The Veratrum is principally used as an external application to cutaneous eruptions, and even in such cases has not unfrequently caused emesis and great gastric distress. The roots of the *Helonias dioica* are also used, according to Dr Dana, as an emetic in domestic practice in Ohio.

Among the ASPHODELEÆ many plants of considerable emetic properties are to be found, at the head of which is the *Scilla maritima*, and the root of a native species, the *Aletris farinosa*, although a powerful tonic in small doses, acts as an emetic when administered in any quantity, also causing unpleasant general symptoms, as dizziness and narcotism.

In the class SMILACEÆ are also included some active plants, whose properties have not been sufficiently investigated. The roots of all the species of *Trillium* are acrid and emetic, but have been but little resorted to for this purpose; as regards the *Medeola virginica*, although Shœpf supposed it might prove analogous in its effects to Ipecacuanha, it does not appear to be possessed of any decided powers, as it is eaten by the Indians; in large quantities it is said to be diuretic, like the *asparagus*.

The beautiful class of LILIACEÆ are more remarkable for the brilliancy of their flowers, than for any medical virtues they possess. One species, however, the *Erythronium americanum*, has obtained some notice for its emetic powers; these are most striking when the plant is in a fresh state, when twenty or thirty grains will act with some violence, whereas, after keeping for some time, double the quantity often fails in producing any effect. It has been proposed by Bigelow as a substitute for *Colchicum*, but many other plants of much more power might readily be selected.

With regard to the remaining classes of this order, and those belonging to the VASCULARES, we have but little information that is definite, of emetic qualities being possessed by them; it is highly probable, however, that many of them are endowed with this power, especially among the *Fungi*.

It may be perceived from the above sketch that we have but few native vegetables which can be substituted with certainty or safety for Ipecacuanha, and even these have not been sufficiently investigated to enable us to come to a satisfactory conclusion as respects their true powers. Enough, however, is known respecting them, to induce a belief that the best substi-

tute for the foreign root is either the *Phytolacca* or *Gillenia*, for although the *Euphorbia ipecacuanha*, *E. corollata*, and the several species of *Apocynum* are entitled to consideration, their acrimony and stimulating properties render them unfit for indiscriminate administration where emetics are required.

ARTICLE XLV.—*Note on the Solution of Proto-iodide of Iron (Hydriodate of Protoxide of Iron). By E. Durand.*

This therapeutic agent was lately introduced into medical practice in Philadelphia by Dr Samuel Jackson, on whose recommendation it is now pretty extensively used in this city and in some parts of the country. Dr Jackson first applied to me for this article, of a strength nearly equal to that of his solution of ioduretted iodide of potassium, and, as far as I am able to ascertain, I have since been the only preparer of this medicine, generally prescribed by the name of Dr Jackson's solution of iodide of iron. The process which I have followed in the preparation of this article is that of MM. Baup and Caillot, as described at page 201 of the first volume of this Journal, in the article "*Iodide of Potassium*" of a translation headed "*On the Preparation of the Iodides.*" As I have made some alterations in the proportion of the iron filings, to avoid the production of a per-iodide of iron, and in that of the water, which I have increased in order to dilute the solution to the desired strength, I will here state in full my own formula:

℞. Iodine	ʒ x.
Iron filings, perfectly pure and unoxidized	ʒ v.
Distilled water	ʒ xii ss.

Put the iodine into a porcelain capsule, with one half the quantity of water above directed, add the iron filings by small

portions, stirring the mixture with a glass rod.* The combination soon takes place; heat is evolved with a disengagement of a small quantity of vapours of iodine, and the mixture acquires an orange colour, which gradually deepens to a dark red. When the whole of the iron has been added, the capsule is put on a sand bath or over the flame of a spirit lamp and heated slowly; continuing to stir the liquid. An ioduretted hydriodate of iron is first produced, which, by the action of heat, soon passes to the state of a simple hydriodate. This point is indicated by the entire discolouration of the solution. In this state it is filtered, and the dregs and filter are carefully washed with the remaining half of the distilled water, previously heated to the boiling point. In this manner a solution forming twelve and a half fluid ounces is afforded, one ounce of which represents one drachm of iodide of iron.

This solution, which at first is colourless, acquires a deep red colour by standing, and precipitates some oxide of iron. It is thus reduced to the state of an ioduretted hydriodate of iron; but it may easily be restored to its former state by heating it again with a small quantity of iron filings, until the liquid becomes colourless. As this decomposition might take place when in the hands of persons unacquainted with chemical manipulation, and in order to avoid the trouble of recomposing it, I will suggest the propriety of preparing at once the iodide of iron and forming the solution when prescribed, of a strength suitable to the purposes of the physician, or equal to that of Dr Jackson, that is, one drachm to the fluid ounce. I am the

* The translator of the article headed "On the Preparation of the Iodides," has not rendered the sense of the text, when saying, "If proper care be not observed when the water is added to the iodide, so much heat will be disengaged as in great measure to volatilize this substance, and endanger the breaking of the vessel." The text recommends, on the contrary, not to mix the iron with the iodine before this substance be immersed in the water, otherwise its action upon iron is so powerful that it disengages much heat, by which a portion of the iodine is volatilized. Water has no other action upon iodine, except that it dissolves about one-seven thousandth, by which it acquires an orange colour.

more inclined to recommend this method, as I have remarked that solutions made directly from the iodide are not so liable to decomposition.

The iodide of iron is obtained by evaporating to dryness, the above filtered solution, taking care, towards the end, to stir it incessantly with an iron spatula, and to detach the salt from the bottom of the capsule, as it forms. The heat must be managed with the greatest care, diminishing it gradually, and removing quickly the capsule from the fire as soon as the odour of iodine is evolved. The above quantities yield about twelve drachms and a half of iodide. This salt is of a greenish black colour, passing to a metallic grey if the heat is too strong or too protracted. Its taste resembles that of chloride of iron; it is, like this salt, very deliquescent, and requires of course to be kept in small bottles well stopped. Its solution, when the iodide is well prepared, is of a light orange colour, and deeper in proportion to the decomposition which some parts may have undergone towards the end of the operation.

ARTICLE XLVI.—*Note on the Œnothera Biennis. By R. Eglesfeld Griffith, M.D.*

No change in the materia medica has been more strongly marked than the almost exclusive employment, during a long succession of ages, of vegetable remedies, and their subsequent disuse in favour of those derived by the aid of chemistry from the mineral kingdom; to trace the causes which led to this change would be extremely interesting and instructive, but would by no means accord with the practical character of our work. That man, in the early stages of civilization, always

resorted to the vegetable world for remedies to assuage pain and alleviate disease, is a fact too well established to require proof, and it is equally certain that his hopes were not disappointed; when, however, medicine, instead of being considered as a sacred calling, became a mere trade, a strong temptation arose among competitors in the art, to employ the most active means, in order that they might produce rapid and conspicuous effects. A better state of things, however, has now dawned upon us, and the powers of nature, instead of being derided and even thwarted, are now consulted and aided as much as possible.

In no department of the healing art was this more strikingly exemplified than in the treatment of cutaneous diseases; but a few years since, the usual remedies resorted to for their cure were the different preparations of lead and mercury, or even those of a more caustic character; a more correct physiology has, however, shown that much more benefit is to be derived, at least in a majority of cases, from the employment of milder means. The use of emollients, &c. have also the additional good effect of never occasioning the terrible sequelæ which too often follow the use of the more heroic remedies.

We have been led to these remarks from the benefits we have seen to result from the employment of a therapeutic agent, whose virtues are scarcely known, in the cure of obstinate eruptions. We allude to the *Œnotherabi ennis*, or evening primrose, called also, and more especially in New England, by the name of *Scabish*, a corruption, as is observed by Dr Bigelow, of *Scabious*, with which plant, however, it has no affinity. It may also be well to remark, that it is very different from the plant generally known in New Jersey by the same vulgar name; this is the *Erigeron Philadelphicum* or *E. Canadense*, for both are indiscriminately made use of.

The *Œnothera biennis* is a tall perennial plant, very common on the borders of fields and in natural hedges, and is also, though *more rarely*, to be found in thickets along water courses.

Œnothera. Octandria monogynia. Lin. sex. syst. Onagræ.

Juss. Nat. ord. *Calyx* tubulous, 4-cleft, segments deflected, deciduous. *Petals* 4, inserted upon the calyx. *Stigma* 4-cleft. *Capsule* 4-celled, 4-valved, inferior. *Seeds* naked, affixed to a central 4-sided receptacle. *Nuttall.*

Œ. biennis. Stem villous, scabrous. *Leaves* ovate lanceolate, flat. *Flowers* terminal, subspicate-sessile, with the stamens shorter than the corolla. *Willdenow.*

Œ. Mollissima. Walt?

Icon. Mill icon, t. 89. fig. 2. Flor. Dan. 446. Lamarck. Illus. t. 219. fig. 1.

Description. Stem from three to five feet high, rough, hairy and branching. Radical leaves petiolated; cauline leaves sessile, both pubescent, and more or less dentate. Flowers solitary, sub-axillary. Ovary sessile, 4-grooved, inferior, surmounted by a long tubular calyx, which divides into four reflexed segments. Petals large, rounded, sometimes emarginate.

When this plant grows in secluded situations, the leaves become covered with a white mucor, giving them a highly pubescent appearance. On cultivation, the flowers of this plant become of a much deeper colour and of a larger size, resembling those of the *Œ. grandiflora.* They expand in the evening, just at the commencement of twilight, and continue open till the sun begins to acquire some power the succeeding morning. The same flower does not expand a second time. Pursh states that he has "frequently observed a singularity in this plant, and it might be interesting to make further inquiry into its cause; it is, that in a dark night, when no objects can be distinguished at an inconsiderable distance, this plant, when in full flower, can be seen at a great distance, having a bright white appearance, which probably may arise from some phosphoric properties of the flowers."*

The medical properties of the plant under consideration,

* Flora, Am. septen. 1, p. 261.

appear to be confined to the bark; these, in a recent state, are mucilaginous, and leave a slight sensation of acridity in the fauces after being chewed; this latter is not so perceptible after the plant has been dried, though this process does not appear to diminish the quantity of mucilage.

Accidentally hearing of the powers of a decoction of the Œnothera in the cure of infantile eruptions, I was induced to give it a trial in several cases of an obstinate character, which had resisted the most approved plans of treatment, and have been so well satisfied that its virtues in the alleviation of these cutaneous affections were not overrated, as to resort to it habitually, not only in these complaints, but also in many others of even a more severe character. In one case of Herpes zona, its good effects were strikingly visible in a short time. In the cure of tetter, often a very rebellious disorder, it has also proved highly useful.

The plant is to be gathered about the flowering season, and the small twigs, with the bark of the large branches and stem, retaining with them the leaves, to be dried in the shade. Of these a strong decoction is to be made, with which the eruption is to be bathed several times during the day.

From some trials I lately made with this article, it also appears to possess the abstergent qualities of the *Quillea saponaria*, though not in an equal degree, though fully as much so as the *Saponaria officinalis*.

Since writing the above, in looking over the Herbarium of the late Dr B. S. Barton, now in possession of the American Philosophical Society, I found that one of the specimens of the *O. biennis* was labelled "King cure-all in sores," proving that its emollient properties were also popularly known in another class of diseases.

Article XLVII.—*Pharmaceutical Notices.—No.* 6.

——————————— jus est
Judiciumque. *Horace.*

Morphia.—Among the Pharmaceutical Notices inserted in the last number of this Journal, is one headed *Morphine*, and signed A., in which I have remarked, with some degree of regret, the following sentences: "*The French morphine contains one third its weight of narcotine*, &c." And below: "*Sulphate of morphine is, when pure, beautifully white, not at all possessed of a brown shade like that of the French*, &c." I cannot conceive what has been the cause of this abuse upon these two articles, unless it were that they are of French origin. Whether it be from national prejudice or ungenerous motives on the part of their author, it is not my business to inquire? But I challenge A. to produce any morphine or its sulphate, lately and directly imported from the laboratory of any respectable chemist in France, that will answer to the description he so confidently gives to all these French products indiscriminately.

I confess that A. would have been perfectly justifiable in cautioning the public against spurious articles sold in this country, and which, with counterfeit labels and seals of respectable houses in Paris, are daily imposed upon our druggists as genuine. To such he might, perhaps with justice, have affixed his stigma; but I deny the bearing of his assertion on those preparations which come directly from Messrs Robiquet, Pelletier, and other well known chemists, who are largely engaged in the manufacture of these delicate chemicals. I have seen and manipulated much of their morphine and sulphate of morphine, and have always found them, to say the least, equal in every respect to the same preparations made in this country, or imported from England or Germany.

After the honest and public avowal made some time ago by

the French chemists themselves, it is obvious that I will not pretend to affirm that their morphine has always been entirely free from narcotine; but such as it was formerly, they themselves, as well as every chemist acquainted with their high standing as men of honour and science, considered it as pure, and as such it was launched into commerce *optimâ fide.* Nevertheless, their morphine was not inferior to that manufactured in any other country, for all the morphine then made was more or less contaminated with narcotine. This general defect arose from the imperfect knowledge as yet acquired respecting the nature of narcotine, and from the similarity of action, both of precipitants and of acids, generally, upon these two substances.

In the science of chemistry, which, though in its infancy, is so zealously cultivated in all civilized nations, error cannot long remain associated with truth; careful and protracted investigation soon separates the one from the other. The French chemists have not remained in arrears of others in the prosecution of this science; they were the first to ascertain and publish that morphine, even when carefully prepared agreeably to the best processes employed at that period, was still contaminated with narcotine; and to devise better means to obtain this substance in a state of purity. The result of their labours has not been unsuccessful, and the essays of Pelletier, Henry and Plisson, Guillermond, Girardin, Robiquet and others, still rank among the best that have been written upon this subject in any country. The last of these gentlemen published, more than a year ago, some interesting notes upon narcotine, which were translated for, and inserted in the number of this Journal for April last, and to which I take the liberty of referring the author of the article under consideration, as well as such of our readers as may desire to investigate this matter and ascertain the best methods of detecting the presence of narcotine in morphine or its salts.

I now ask in what light the strictures of A. upon French morphine and its sulphate can be viewed? Had his remarks

been directed against these articles generally, as not being constantly pure, but not against those prepared in France only, they might have been received as highly interesting to physicians and pharmaceutists; but in the shape in which they are presented, they must appear, to say the least of them, very illiberal and unfounded; especially when we refer to previous notices from the same source, in which the author asserts that he has detected from fifteen to twenty-five per cent of sulphate of quinine in samples of "*what was termed genuine sulphate of morphine imported from France,*" and announcing in the following paragraph that he is manufacturing largely morphine and its salts. (See No. XIII, page 15, 16.)*

E. DURAND.

Quercia.—In an extract from my Inaugural Thesis, published in the first volume of this Journal, page 97, it is stated a crystalline matter was obtained from the bark of the *Quercus falcata*, which, on the supposition of its being a salifiable base, *sui generis*, I called Quercia. Recent experiments have shown me the inaccuracy of my supposition, and proved it to be the sulphate of lime; which has the peculiar property, then unknown to me, of dissolving without decomposition in dilute, sulphuric, nitric and muriatic acids, and separating from these solutions when concentrated, in long, silky, transparent crystals. It is also thrown down by ammonia, unaltered from its acid solutions: this property, and its solubility in dilute sulphuric acids, I think have not heretofore been recorded.

Sulphate of Morphia.—In recently preparing some sulphate

* I have tried some sulphate of morphia received about a year ago from Mr Levaillant's manufactory, with a view to investigate the degree of its purity. I have found that it gave by maceration in sulphuric ether, four per cent of a residue formed of colouring matter, narcotine, and a small quantity of morphine. This sample was rather inferior in appearance to others I have had from the same source. Its whiteness, however, was equal to that of sulphate of quinine. Let the reader compare this analysis with that of A. (one third of narcotine and twenty-five per cent of sulphate of quinine)!!!

of morphia I obtained some very large and hard crystals, the size and appearance of which led me to suppose that they might possibly be a triple salt of morphine and narcotine. An analysis, however, which I made, proved them to be pure sulphate of morphia. The size of the crystals was owing no doubt to very slow evaporation from a solution not very concentrated. Their form was the same as sulphate of morphia usually assumes.

J. SCATTERGOOD.

REVIEW.

ARTICLE XLVIII.—*The Dispensatory of the United States; by George B. Wood, M.D.; Professor of Materia Medica in the Philadelphia College of Pharmacy, &c., and Franklin Bache, M.D.; Professor of Chemistry, in the Philadelphia College of Pharmacy, &c., 8vo. Philadelphia, Grigg and Elliot,* 1833.

A DISPENSATORY is a comprehensive manual for the medical and pharmaceutical communities. To the physician, it is the descriptive catalogue of the various substances supplied by abundant nature, and elaborated by art and experience for the cure of human ills. To the pharmaceutist, it is a book of daily reference, a chief source of his acquaintance with the history and properties of the materials of his business, the repository to which he looks for a criterion of their quality, and, next to the Pharmacopœia, his text-book and authority, for the strength and composition of his preparations. It is to be expected, then, that a work of so much importance, should contain, in a condensed form, the sum of the knowledge of the age, on those subjects of which it professes to treat; that it should not content itself with the character of a mere record of the researches of former times, with a sprinkling, here and there, of more modern intelligence; nor yet that it should, with the confusion of inexperience and ignorance, offer only an indiscriminate collection of the novelties and crudities of the day, a *rudis indigestaque moles.* But, looking with reverence on the labours of our fathers, it should cull from their pages all that is

really and practically useful; and keeping pace with the outposts of advancing knowledge, should gather and mingle with its treasure, whatever of modern discovery is important and well ascertained. It should be clear and consistent, in nomenclature, as well as arrangement; and accuracy and individual research should characterise its pages.

How far the Dispensatories which have hitherto issued from the American press have answered this description, let the disappointments of the student, and the complaints of the profession, spare us the necessity of inquiring. The British works, moreover, from which our American Dispensatories have been chiefly compiled, are themselves little more than re-edited copies of a book certainly of acknowledged merit, but little adapted to the present state of our knowledge. Dr Lewis's Dispensatory, first published about the middle of the last century, has formed the ground-work alike of Duncan's and Thomson's Dispensatories; and although much merit is due to these gentlemen, as editors, it cannot be denied that their labours are extremely incomplete. The public, in short, have been impatiently looking for a Dispensatory in the English language, adapted to the pharmaceutical, chemical, and medical knowledge of the times. We, therefore, hail with peculiar gratification, the volume whose title is placed at the head of the present article. We congratulate the American republic of letters and science on the appearance amongst us of a work of original and laborious research, sound learning and discrimination, and great practical utility. Glancing over its pages, we proceed to lay before our readers such a view of its contents as the limits of our present number will permit, referring them, with confidence, to the work itself, for a more intimate acquaintance with it.

This work, like most others of the kind, divides itself naturally into two parts; the first, which occupies nearly two-thirds of the book, contains the various articles of the materia medica, alphabetically arranged; and the second is devoted to the preparations.

"Under the head of materia medica," say the authors, "we treat of medicines in the state only in which they are produced by nature, or come into the hands of the apothecary. Of these medicines, such as are recognised by our national Pharmacopœia are most minutely described; but we consider also, all that are included in the officinal catalogues of the British colleges, and some others which appear to deserve attention from their present or former reputation."

On entering this division, we shall take the liberty of offering a few miscellaneous observations; and if others should occur as we proceed, our readers must pardon us for being somewhat desultory. We remark, in the first place, on looking over the book, the closeness of its page, and the condensed manner in which it is printed; each page having, probably, one third more letter-press than the average of either Duncan's or Thomson's, and a fourth or fifth more than those of Dr Coxe. We notice, also, copious lists of synonymes, and great perspicuity in the physical descriptions of each article as an object of natural history. The arrangement which the authors have adopted seems to be this: first, the officinal name of the article in question, giving a proper preference to the nomenclature of the Pharmacopœia of the United States; then its English or common name; after this its definition in the Pharmacopœia of the United States; next its officinal synonymes in the British Pharmacopœias, and its names in various foreign languages; then its classification as an object of natural history, with its authentic characters and references to plates and descriptions. Afterwards we have its natural and commercial history, a specification of its physical properties, of its medical properties and uses, and lastly, an enumeration of the officinal preparations in which it occurs. On the history, natural and commercial, great labour of research and precision of observation appear to have been bestowed; and indeed, with so happy a result in elucidating many confused or doubtful points, and furnishing to the druggist interesting commercial information, with a particular reference to the produce and drug-market

of this country, as, independently of the other merits of the work, to stamp it with an original and highly interesting character. The article on Cinchona, which occupies thirty-two of its closely printed pages, may be particularised as a monograph of great scientific value, and as giving the most satisfactory elucidation which we have seen, of that perplexed and difficult subject. We strongly recommend it to the reader's particular attention.

The article on vinegar is valuable, as are also those on some others of the acids, particularly the nitric and sulphuric, accompanied by tables of the actual strength of those acids at different specific gravities. The following notice of the manufacture of alum in this country, may be new to many of our readers.

"Alum has not been an article of import into the United States since 1818, or a year or two earlier; the demand since then having been entirely supplied by the domestic manufacture. There are at present six establishments in the United States where alum is manufactured; namely, two in Baltimore, one in New-York, and three in Massachusetts—at Salem, Roxbury and Newton. The aggregate quantity made in these works, may be estimated at from a thousand to twelve hundred tons. The method employed consists in the direct combination of sulphuric acid with clay. Lately, however, Messrs Tyson and Ellicott, manufacturing chemists of Baltimore, have commenced working the ore found at Cape Sable, on the Magothy river, Maryland. This ore, which was extensively worked during the late war, under the superintendence of Dr Troost, consists of lignite, clay, sulphuret of iron and sand. It exists in beds of from six to ten feet in thickness, covered by a stratum of sand. It is dug up and thrown into heaps of from one to three thousand tons, is set on fire, and continues to burn for years. The ashes are transported to the manufactory, where they are lixiviated and evaporated in leaden vessels. When the solution indicates about 25° of Baumé's hydrometer, sulphate of potassa is added, after which it is drawn off to crys-

tallise. At the end of about a week, the crystallization having been completed, the mother-waters are pumped off; and the crystals, after being washed and well drained, are dissolved in leaden boilers. From these the solution is transferred to the refining vessels, and left for about three weeks to crystallise. At the end of that time, the mother-waters are drawn off from the crystals, and these are broken up, dried, and packed in barrels."

Under the head "*Aqua*," p. 100 and 101, we have a useful synopsis of the constituents of a variety of mineral waters; and cannot but regret, that the authors were unable to add the analysis of the "White Sulphur" and "Salt Sulphur" springs in Virginia, which may be ranked among the most valuable mineral waters of our country.

Although the recently discovered elementary principle termed *Bromine*, can scarcely yet be considered strictly as an officinal article, its importance as a chemical agent, and the circumstance of its beginning to be used in medicine, have procured for it a place in this Dispensatory. For a full account of its chemical habitudes, we would refer the reader to Vol. II, page 89, &c. of this Journal; but to the physician, the following extract relative to its medical properties will not be without value.

"From the active chemical properties possessed by bromine, it might be presumed, *à priori*, to be a substance capable of exerting a powerful influence over the animal economy. Accordingly, experiments were very early instituted with it as a remedy. The result of the trials seems to prove, that like iodine, it increases the activity of the lymphatic system, promoting the absorption of scrofulous and other tumours, especially goitre. It has been exhibited in aqueous solution, as hydrobromate of potassa, and in the form of proto or deutobromide of mercury. The dose of the aqueous solution, containing one part of bromine to forty parts of distilled water, is about six drops, to be taken in the course of the day. The hydrobromate of potassa is given in the form of pill, in grain

doses twice a day, gradually increasing to six or eight grains. Externally it is employed as an application to tumours, in the form of an ointment, in the proportion of a drachm of the salt to an ounce of lard. The two bromides of mercury are very analogous, in their mode of action, to the corresponding chlorides of the same metal. The deutobromide of mercury is a corrosive poison, and requires to be administered in minute doses. Dr Wernick, an Austrian surgeon, gave it in etherial solution, made by dissolving a grain of the deutobromide in a drachm of ether, of which ten, fifteen, or twenty drops may be taken daily. Some authorities attribute more activity to the preparations of bromine than to those of iodine. Further observations, however, are required to determine the precise rank which bromine should occupy as a remedial agent.

"Bromine in overdoses acts as a poison. Its most active combination is perhaps the deutobromide of mercury, for which, as for the deutochloride, the best antidote is albumen."

At page 152, &c., we have a good practical article on the *Cantharis;* but we would beg leave to suggest that in future editions the printer be instructed, that the plural of *elytron* is not "elytræ;" and we would also call the attention of the authors to a series of experiments lately instituted by Dr T. E. Beesley of this city, with a view to ascertain the circumstances, by which the power of cantharides to produce strangury may be effected; the results of which, if confirmed by future experience, will possess considerable importance. (See Vol. II, p. 271, of this Journal). The authors have very properly taken notice of the refutation, by Farines, of Perpignan, of the idea once prevalent, that the vesicating property of the insects was not injured by the mites which so frequently prey upon them, and reduce them to powder. "M. Farines has satisfactorily shown, that though the hard parts, left by these mites, possess some vesicating power, and the powder produced by them still more, yet the sound flies are much stronger than either." Under the head "*Cantharis vittata,*" we have an interesting account of various species inhabiting the United

States, which have been employed as substitutes for the C. vesicatoria, and found to be equally efficient.

We observe that the ever-varying *Cardamom* is made to belong neither to Amomum, nor Elettaria, nor Matonia, but at length, *post tot naufragia*, to the genus Alpinia, on the authority of the celebrated Dr Roxburgh. It is to be hoped that this is its final destination.

Passing over the article on Cinchona, noticed above, we are tempted to extract the following elucidation of the true origin of Cinnamon, and the commercial history of that valuable aromatic.

"The cinnamon tree grows to the height of twenty or thirty feet, with a trunk from twelve to eighteen inches in diameter, irregular, knotty, and covered with a thick, rough, scabrous bark, which is externally ash-coloured, internally reddish. The branches are numerous, strong, horizontal, and declining. The young shoots are beautifully speckled with dark green and light orange colours. From the root spring numerous suckers, which form a bush about the trunk. The leaves are from six to nine inches long, and from two to three broad, entire, oblong, pointed, three-nerved, with the lateral nerves vanishing as they approach the point. They are in opposite pairs, and stand upon short slightly channelled footstalks. When young they are generally of a scarlet or light liver-colour, become olive as they approach maturity, are afterwards of a shining green, and ultimately, before they fall, of an olive-yellow. The flowers are small, white, and arranged in axillary and terminal panicles. The fruit is an oval berry, which adheres like the acorn to the receptacle, is larger than the black currant, and when ripe has a bluish-brown surface thickly scattered with white spots.

"The tree emits no smell perceptible at any distance. The bark of the root has the odour of cinnamon with the pungency of camphor, and yields this principle upon distillation. The leaves have a spicy odour when rubbed, and a hot taste. The petiole has the flavour of cinnamon. It is a singular fact, that the odour of the flowers is to people in general disagreeable,

being compared by some to the scent exhaled from newly sawn bones. The fruit when opened has a terebinthinate odour, and a taste in some degree like that of juniper berries. It is the prepared bark that constitutes the spice so well known and so highly valued under the name of cinnamon.

"This species of laurel is a native of Ceylon, where it has long been cultivated for the sake of its bark. It also grows in Malabar; in Sumatra, Java, Borneo, Sooloo, and the neighbouring islands; and in Cochin-china, Tonquin, the Chinese province of Quangsi, the Philippines, the Nicobar Islands, and other parts of the East. It has at various periods been introduced into the Isle of France, Bourbon, the Cape de Verds, Brazil, Cayenne, several of the West India Islands, and lately into Egypt; and in some of these places it is at this time highly productive. This is particularly the case in Cayenne, where the plant was flourishing so early as the year 1755. It has been doubted whether the tree which grows in Sumatra, Cochin-china, &c., is the real Laurus Cinnamomum, or another species of the same genus. Some authors consider it a distinct species, with the name of Laurus Cassia; but there is reason to believe, both from the reports of travellers, and from the similarity of its product with that of the Ceylon tree, that the two plants are specifically identical, and differ only in consequence of the variety of soil and climate to which they are exposed. The Laurus Cinnamomum is exceedingly influenced, as regards the aromatic character of its bark, by the circumstances of soil, and climate, and mode of culture. Thus we are told by Marshall, that in Ceylon, beyond the limits of Negombo and Matura, in the western and southern aspect of the island, the bark is never of a good quality, being greatly deficient in the spicy, aromatic flavour of the cinnamon; and that even within these limits it is of unequal value from the various influence of exposure, soil, shade, and other circumstances.

"*Culture, Collection, Commerce, &c.* Our remarks under this head will first be directed to the cinnamon of Ceylon, in

relation to which we have more precise information than concerning the aromatic obtained from other sources. The bark was originally collected exclusively from the tree in a wild state; but under the government of the Dutch the practice of cultivating it was introduced, and it has been continued since the British have come into possession of the island. The seeds are planted in a prepared soil at certain distances, and as four or five are placed in a spot, the plants usually grow in clusters like the hazel bush. In favourable situations they attain the height of five or six feet in six or seven years, and a healthy bush will then afford two or three shoots fit for peeling; and every second year afterwards will afford from four to seven shoots in a good soil. The cinnamon harvest commences in May and continues till late in October. The first object is to select shoots proper for decortication, and those are seldom cut which are less than half an inch or more than two or three inches in diameter. The bark is divided by longitudinal incisions, of which two are made opposite to each other in the smaller shoots, several in the larger, and is then removed in strips by means of a suitable instrument. The pieces are next collected in bundles, and allowed to remain in this state for a short time, so as to undergo a degree of fermentation, which facilitates the separation of the cuticle. The epidermis and the green matter beneath it are removed by placing the strip of bark upon a convex piece of wood and scraping its external surface with a curved knife. The bark now dries and contracts, assuming the appearance of a quill. The peeler introduces the smaller tubes into the larger, thus forming a congeries of quills into a cylindrical pipe which is about forty inches long. When sufficiently dry, these cylinders are collected into bundles weighing about thirty pounds, and deposited in the government warehouses. The East India Company, which has a monopoly of the commerce in cinnamon, employs inspectors, who open the bales and carefully examine every quill, dividing them into three sorts, two of which are intended for exportation, and the third, consisting of bark that is too old, or too

young, or altered by the weather, or inferior from some other cause, is rejected. The better kinds are put into bundles, and shipped for England in the Company's vessels at the ports of Galle and Columbo. The bark of inferior quality is either employed for preparing oil of cinnamon, or exported to the continent of India, whence much of it is said to reach Europe under the name of cassia.

"Immense quantities of cinnamon are exported from China, the finest of which is little inferior to that of Ceylon, though the mass of it is much coarser. It passes in commerce under the name of *cassia*. Travellers inform us that the best cinnamon produced in Cochin-china is quite equal to the best of Ceylon; but is monopolized by the sovereign of the country. The inferiority of that which circulates in commerce is probably attributable to the want of care in selecting and preparing the bark. It is supposed that most of the cinnamon obtained from China is imported into that country from Cochin-china and the islands of the Indian Archipelago; but we have good authority for the belief, that this spice is also cultivated within the limits of the Celestial empire.

"Cayenne, and several of the West India Islands, yield to commerce considerable quantities of cinnamon of various qualities. That of Cayenne is of two kinds, one of which closely resembles, though it does not quite equal, the aromatic of Ceylon, the other resembles the Chinese. The former is supposed to be derived from plants propagated from a Ceylonese stock, the latter from those which have sprung from a tree introduced from Sumatra.

"By far the greater proportion of cinnamon brought to this country is imported from China. It is entered as *cassia* at the custom houses, while the same article brought from other sources is almost uniformly entered as cinnamon. By an examination of the treasury returns from the year 1820 to 1829, we find that the average annual import of this spice has been, in round numbers, 652,000 pounds from China, 12,000 pounds from England, 9000 pounds from the British East Indies,

3000 pounds from the West Indies, and an insignificant quantity from all other places, with the exception of 12,758 pounds brought in one year from the Philippines. There is no doubt that much of the amount brought from China is exported; but we have not been able to ascertain the proportion.

"Though cassia and cinnamon were both terms used by the ancients, it is impossible to ascertain with certainty whether the spices which they designated were identical with those known by the same names in modern times. Neither the plants nor their localities, as described by Dioscorides, Pliny, and Theophrastus, correspond precisely with our present knowledge; but in this respect much allowance must be made for the inaccurate geography of the ancients. It is not improbable that the Arabian or other Eastern navigators, at a very early period, conveyed this spice within the limits of Phœnician and Grecian, and subsequently of Roman commerce.

"*Properties.—Ceylon cinnamon* is in long cylindrical fasciculi, composed of numerous quills, the larger inclosing the smaller. It is of a light yellow colour, almost as thin as paper, smooth, shining, pliable to a considerable extent, with a splintery fracture when broken. It has a pleasant fragrant odour, and a warm, aromatic, slightly pungent, sweetish and highly agreeable taste. When distilled it affords but a small quantity of essential oil, which, however, has an exceedingly grateful flavour. It is brought to this country from England; but is very costly, and is not generally kept in the shops. The finer variety of *Cayenne cinnamon* approaches in character to that just described, but is paler, and in thicker pieces, being usually collected from older branches. That which is gathered very young, is scarcely distinguishable from the cinnamon of Ceylon. It is not recognized in our markets as a distinct variety.

"The *Chinese cinnamon*, called *cassia* in commercial language, is in single tubes of various sizes, from an eighth of an inch to half an inch or even an inch in diameter. Sometimes the bark is rolled very much upon itself, sometimes is not even completely quilled, forming segments more or less exten-

sive of a hollow cylinder. It is of a redder or darker colour than the finest of the East India Company's cinnamon, thicker, rougher, denser, and breaks with a shorter fracture. It has a stronger, more pungent and mucilaginous, but less sweet and grateful taste; and, though of a similar odour, is less agreeably fragrant. It is the kind almost universally kept in our shops, and while it is much cheaper than the former variety, is perhaps not inferior to it for the preparation of the various tinctures, &c., into which cinnamon enters as an ingredient. Of a similar character is the cinnamon imported directly from various parts of the East Indies. But under the name of cassia are also brought to us very inferior kinds of cinnamon, collected from the trunks or large branches of the trees, or injured by want of care in keeping, and perhaps some derived from distinct species of Laurus. It is said, that cinnamon from which the oil has been distilled, is sometimes fraudulently mingled with the genuine. These inferior kinds are detected, independently of their greater thickness and coarseness of fracture, by their deficiency in the peculiar sensible properties of the spice.

"We have treated of cinnamon and cassia under the same head; because, even admitting the latter to be sometimes derived from the Laurus Cassia, we are absolutely certain that much of what is sold by that title is real cinnamon, and we are in possession of no grounds by which we can distinguish them. The only differences observable between the numerous varieties, are such as might readily arise from causes unconnected with difference of species; and even the mucilaginous taste of cassia, is ascribed by Dr A. T. Thomson to the circumstance, that the larger branches being decorticated, and the cuticle only removed, the cellular integument is left, thick, spongy, and full of a slimy mucus. In fact, the very existence of the *Laurus Cassia* as a distinct species, is denied by some botanists, who consider it at most but a variety of the *L. Cinnamomum.*

"From the analysis made by Vauquelin, it appears, that

cinnamon contains a peculiar essential oil, tannin, mucilage, a colouring matter, an acid, and lignin. The oil obtained from the Cayenne cinnamon, he found to be more biting than that from the Ceylonese, and at the same time to be somewhat peppery. This aromatic yields its virtues wholly to alcohol, and less readily to water. At the temperature of boiling alcohol very little of the oil rises, and an extract prepared from the tincture retains therefore the aromatic properties."

Under the head *Hirudo Medicinalis*, p. 336, &c., we have the first authentic account of the American leech (*Hirudo decora*, of Say) which has appeared in any medical work. The article on *Iodine* will be found by the physician to contain a condensed view of the medical uses of that important agent.

We extract the whole article on Rhatany, believing that this very useful astringent has not hitherto received that attention in this country, which a better acquaintance would have ensured for it.

"KRAMERIA. *U. S. Rhatany.* 'Krameria triandra. Radix. *The root.*' *U. S.*

"*Off. Syn.* KRAMERIÆ RADIX. Krameria triandra. Radix. *Lond.*; KRAMERIA TRIANDRA. Radix et Extractum. *Dub.*

"Ratanhie, *Fr.*; Ratanhiawurzel, *Germ.*; Ratania, *Ital.*, *Span.*

"KRAMERIA. *Class* Tetrandria. *Order* Monogynia.—*Nat. Ord.* Polygaleæ, *Juss.*

"*Gen. Ch. Calyx* none. *Corolla* 4-petalled; the superior nectary 3-parted, and inferior 2-leaved. *Berry* dry, echinated, 1-seeded. *Willd.*

"*Krameria triandra.* Ruiz and Pavon, *Flor. Peruv.* i. 61. The rhatany plant is a shrub having a long, much branched, and spreading root, of a blackish-red colour, with a round, procumbent, very dark coloured stem, divided into numerous branches, of which the younger are leafy and thickly covered with soft hairs, giving them a white silky appearance. The leaves are few, sessile, oblong-obovate, pointed, entire, pre-

senting on both surfaces the same silky whiteness with the young branches on the sides of which they are placed. The flowers are lake-coloured, and stand singly on short peduncles at the axils of the upper leaves. There are only three stamens. The nectary consists of four leaflets, of which the two upper are spathulate, the two lower roundish and much shorter: it does not correspond with the generic character of Willdenow, which was drawn from the *Krameria Ixina*. The fruit is globular, of the size of a pea, surrounded by stiff reddish-brown prickles, and furnished with one or two seeds.

"This species of Krameria is a native of Peru, growing in dry argillaceous and sandy places, and abundant about the city of Huanuco. It flowers at all seasons, but is in the height of its bloom in October and November. The root is dug up after the rains.

"The *K. Ixina*, growing in Hayti, and in Cumana on the South American continent, is said to afford a root closely analogous in appearance and properties to that of the Peruvian species; but the latter only is officinal.

"The name *rhatany* is said to express, in the language of the Peruvian Indians, the creeping character of the plant.

"We receive rhatany in pieces of various shapes and dimensions, some being simple, some more or less branched, the largest as much as an inch in thickness, being derived from the main body of the root, the smallest not thicker than a small quill, consisting of the minute ramifications. They are composed of a dark reddish-brown, slightly fibrous, easily separable bark, and a central woody portion less coloured, but still reddish, or reddish-yellow. The root is without smell, but has a bitter, very astringent, slightly sweetish taste, which is connected with its medical virtues, and is much stronger in the cortical than the ligneous part. The smallest pieces are therefore preferable, as they contain the largest proportion of the bark. The powder is of a reddish colour. The virtues of the root are extracted by boiling water, which forms a dark brown infusion. By digestion in alcohol a deep reddish-brown

tincture is obtained, from which a pink-coloured precipitate separates upon the addition of water. Vogel obtained from 100 parts of the root 40 parts of a red astringent matter which he considered a modification of tannin, 48 of lignin, and minute quantities of gum, starch, and gallic acid. But it is obvious that these proportions must vary according to the relative quantity of cortical and ligneous matter. M. Peschier of Geneva announced the discovery of a peculiar acid in rhatany, which he called *krameric;* but M. Chevallier was unable to procure it by a repetition of the process. The mineral acids and most of the metallic salts throw down precipitates with the infusion, decoction, and tincture; and are incompatible in prescription.

"By evaporating the decoction an extract is obtained, which when dried has a reddish-brown colour, a vitreous and shining fracture, and yields a blood-red powder. It has the bitterness and astringency of the root, and bears a close resemblance to kino. The extract imported from South America is much inferior to that prepared in our shops.

"*Medical Properties and Uses.*—Rhatany is gently tonic and powerfully astringent; and may be advantageously given in chronic diarrhœa, passive hemorrhages, some forms of leucorrhœa, and in all those cases in which kino and catechu are beneficial. It has long been used in Peru as a remedy in bowel complaints, as a corroborant in cases of enfeebled stomach, and as a local application to spungy gums. Ruiz, one of the authors of the Peruvian Flora, first made it known in Europe. It has but recently been introduced into this country, where it is acquiring increased reputation. It has the advantage over the astringent extracts imported, that being brought in the state of the root, it is free from adulteration, and may be prescribed with confidence.

"The dose of the powder is from twenty to thirty grains; but in this form the root is little used. The decoction is more convenient, and is usually preferred. It may be prepared by boiling an ounce of the bruised root in a pint of water, and

taken in the dose of one or two fluid ounces. The extract, when carefully made, is perhaps preferable to any other form, as it is of uniform strength. The dose is ten or fifteen grains. A tincture may be prepared by macerating three ounces of the bruised or powdered root in a pint of diluted alcohol for two weeks. Half an ounce of cinnamon or an ounce of orange-peel may be added to the other ingredients, to improve the flavour, and render the tincture more pleasant to the stomach. The dose is one or two fluidrachms."

A few pages of observations on the general properties of the fixed and volatile oils, will be found useful by the student of pharmacy. We observe that the palm oil is attributed to the *Elais Guiniensis*, a native of the western coast of Africa, instead of the Cocos butyracea, to which it is ascribed by the Edinburgh College. The following account of the manufacture of Castor Oil in the United States, we doubt not will be interesting to our readers:

"This species of Ricinus is a native of the East Indies and Northern Africa; has become naturalized in the West Indies; and is cultivated in various parts of the world, in no country perhaps more largely than in the United States. New Jersey, Virginia, North Carolina, and the states upon the right bank of the Ohio, are the sections in which it is most abundant. The flowers appear in July, and the seed ripens successively in August and September. The part employed in medicine is the fixed oil extracted from the seeds; and as this is always purchased by the apothecary, it has been very correctly placed in the United States Pharmacopœia among the original articles of the Materia Medica.

"The oil may be extracted from the seeds in three ways, 1, by decoction; 2, by expression; and 3, by the agency of alcohol.

"The process by decoction, which is practised in the East and West Indies, consists in bruising the seeds, previously deprived of their husk, and then boiling them in water. The oil rising to the surface is skimmed or strained off, and after-

wards again boiled with a small quantity of water to dissipate the acrid principle. To increase the product it is said that the seeds are sometimes roasted. The oil is thus rendered brownish and acrid; and the same result takes place in the second boiling, if care is not taken to suspend the process soon after the water has been evaporated. Hence it happens that the West India oil has generally a brownish colour, an acrid taste, and irritating properties.

"The mode by expression is directed by the London College, which simply orders the seeds, previously decorticated, to be bruised, and the oil expressed without heat. But these directions are both redundant and deficient. The removal of the outer covering of the seeds is unnecessary, as it contains no injurious principle; and something more than simple expression is requisite to obtain the oil in a state fit to be kept in the shops. The following, as we have been informed, are the outlines of the process usually employed by those who prepare the oil on a large scale in this country. The seeds having been thoroughly cleansed from the dust and fragments of the capsules with which they are mixed, are conveyed into a shallow iron reservoir, where they are submitted to a gentle heat, insufficient to scorch or decompose them, and not greater than can be readily borne by the hand. The object of this step is to render the oil sufficiently liquid for easy expression. The seeds are then introduced into a powerful screw-press. A whitish oily liquid is thus obtained, which is transferred to clean iron boilers, supplied with a considerable quantity of water. The mixture is boiled for some time, and, the impurities being skimmed off as they rise to the surface, a clear oil is at length left upon the top of the water, the mucilage and starch having been dissolved by this liquid, and the albumen coagulated by the heat. The latter ingredient forms a whitish layer between the oil and the water. The clear oil is now carefully removed; and the process is completed by boiling it with a minute proportion of water, and continuing the application of heat till aqueous vapour ceases to rise, and till a small por-

tion of the liquid, taken out in a vial, preserves a perfect transparency when it cools. The effect of this last operation is to clarify the oil, and to render it less irritating by driving off the acrid volatile matter. But much care is requisite not to push the heat too far, as the oil then acquires a brownish hue, and an acrid, peppery taste, similar to those of the West India medicine. After the completion of the process the oil is put into barrels, and thus sent into the market. One bushel of good seeds yields five or six quarts, or about twenty-five per cent of the best oil. If not very carefully prepared, it is apt to deposit a sediment upon standing; and the apothecary frequently finds it necessary to filter it through paper before dispensing it. Perhaps this may be owing to the plan adopted by some, of purifying the oil after expression, by merely allowing it to stand for some time, and then drawing off the supernatant liquid. We have been told that the oil in barrels occasionally deposits a copious whitish sediment in cold weather, which it redissolves when the temperature rises. This substance is probably stearin, or an analogous principle. A large proportion of the drug consumed in the eastern section of the Union, is derived by way of New Orleans from Illinois and the neighbouring states, where it is so abundant that it is sometimes used for burning in lamps."

The article on *Opium*, as might be expected, from the great importance of the subject, and the increased attention which has been of late bestowed on it by chemists, is very copious. We think, however, that without some explanation the reader will be apt to be misled, as to the proportion of morphia to be obtained, by the following sentence (p. 466): "Good opium should yield ten or twelve per cent of the *impure morphia*, precipitated from the infusion by ammonia with alcohol, according to the process of the United States Pharmacopœia." The fact appears to us to be, from frequently repeated trials on a large scale, that a considerable proportion of this "impure morphia" is narcotin. There is, perhaps, half as much narcotin precipitated by the ammonia as there is of morphia, but

so blended with the latter and with colouring matter, as not to be obvious in this stage of the process. The average produce of an avoirdupois pound of good opium, we have found to be one ounce and a third of pure morphia, which is equal to eight and a third per cent.

We think there is a slight error on p. 477, under the head "Panax quinquefolium." The initials "U. S." are given as denoting its having obtained a place in the Pharmacopœia of this country; yet three lines below, we are told that "ginseng" is "not included in any of the Pharmacopœias." The care, however, and research with which this work has been prepared, may be seen to advantage in the department more strictly chemical, as well as in those devoted chiefly to the elucidation of what are generally, in contradistinction, termed drugs. As an instance, we may refer the reader to the accounts of the several commercial salts of lead, potass and soda, from which much useful practical information may be obtained.

We should be happy to give our readers the whole of the interesting articles on *Rhubarb*, *Sarsaparilla* and *Senna*, were the insertion of them compatible with our prescribed limits, and did we not hope that but few of our subscribers will deny themselves the pleasure of their perusal in the work itself.

Under the head *Vinum*, which is well, though concisely treated, we have a useful table, originally published by Brande, of the proportion of alcohol in different varieties of wine, a subject of importance to the physician, more than to the pharmaceutist.

We beg to dissent from the practice of the Dispensatory and National Pharmacopœia in spelling Xanthorrhiza with a single *r*, believing it to be contrary to the analogy of the Greek language, from which the name is taken.

The last article in this division of the work is on the subject of ginger, and very properly advocates the superiority of the Jamaica variety of that valuable spice.

The second part of the work, viz. the Preparations, on which we now enter, will require only a short notice. It appears to

have been prepared with the same scrupulous regard to accuracy, and the same extensive research and practical knowledge of the subject as characterize the former part. It contains all the formulæ of the three British Colleges, as well as those of the Pharmacopœia of the United States, with copious annotations, for the information at once of the physician and the manipulator. This department of the Dispensatory is preceded by a chapter of general and miscellaneous directions for the various operations in pharmacy, which, we doubt not, will be found highly useful in the laboratory. They are evidently the result of individual practice and experience. The descriptions of apparatus are illustrated by wood-cuts, some of which appear to be new, and well adapted to facilitate the business of the apothecary.

This latter part of the work is necessarily of so miscellaneous a nature, that it is out of our power to do more than point out to the reader for his special attention some of the prominent articles, which have struck us as particularly valuable. Such are the treatises under the respective heads of Nitric and Sulphuric Ethers, Tartar Emetic, Ceratum Cantharidis, Emplastrum Plumbi; the general remarks on the preparation of Extracts, the articles on Corrosive Sublimate, and Calomel, Morphia, Potassa, and its Carbonate, Sulphate of Quinia, Bicarbonate of Soda, and the general remarks on Syrups. We may be indulged in a few observations with respect to the remarks on the preparation of morphia and its officinal salts. Speaking of the narcotin, which is almost invariably obtained in company with the morphia, the authors remark, that "the simplest and easiest method of separating it is to submit the mixture to the action of sulphuric ether, which dissolves the narcotin, and leaves the morphia." This use of ether is extravagant, and we cannot think it necessary, except when the morphia is to be used, or sold, not in combination with an acid, which is extremely seldom. In making the salts, the narcotin may very readily be got rid of by a little care in the manipulation. In the instance of the acetate, if the *Acidum aceticum*

dilutum of the Pharmacopœia of the United States is employed without any additional water, and the solution made in a water bath, the narcotin remains undissolved, and may be separated pretty pure from the solution of acetate of morphia by filtration. And in preparing the sulphate, as narcotin is dissolved by diluted sulphuric acid, but does not crystallize in combination with it, most of the sulphate of narcotin (if the combination may be so styled), remains behind in the mother liquors; and the small portion which may possibly be mixed with the crystals of sulphate of morphia, may be separated by a second crystallization.

In conclusion we may observe, that in noticing this work, we are conscious of no motive but the advancement of accurate scientific knowledge; and we are anxious that its merits should be generally and at once known to our readers, from a confidence that the expectations of the public will not be disappointed. We recommend it most cordially to the medical fraternity, to the practical pharmaceutist, and especially to the diligent perusal of the student of medicine or pharmacy. The critical eye of experience may hereafter find errors, and the advance of knowledge will throw light on topics now obscure or imperfectly known; and we shall scarcely claim for the pages before us that praise which we believe was justly bestowed on the recent Pharmacopœia of the United States, of an almost immaculate letter-press. But we cannot refrain from expressing our firm conviction, that, as a whole, this Dispensatory is the best work in the English language, on the subjects of which it treats; and we know of no work so well calculated, in the eyes of our neighbours of Europe, to raise the character of American science.

SELECTED ARTICLES.

Article XLIX.—*New Experiments on Mustard Seed. By MM. Robiquet and Boutron Charlard.*

[Extract. Translated from the French by T. H. Powers.]

The interesting researches of MM. Henry, Jun. and Garot, on white mustard seed, the remarks on them by M. Pelouze, and the reply to these by the experimenters, are of too recent occurrence to be forgotten. In fact it is universally known, that MM. Henry and Garot first discovered a crystalline substance in this seed, which appeared to possess an acid character, and of which, also, sulphur appeared to be one of the constituents, thus resembling the sulpho-cyanic acid in some particulars, but differing from it in many others. The young chemists bestowed the name of Sulpho-sinapic acid on their new substance, to designate both its nature and origin.

More recently, M. Pelouze having remarked some discrepancies between the capacity of saturation of this acid, as deduced from calculation, and those afforded by actual experiments, and having also observed, that in regard to different bases, the quantities necessary for the saturation of the same weight of acid were not in accordance with their atomic weights, thought that it was necessarily owing either to an error as to the acid nature of this substance; or, that its combinations had not been clearly understood.

Desirous of ascertaining which of these conjectures was well

founded, M. Pelouze undertook some experiments, which led him to conclude that the acidity of the products of white mustard seed was owing to the presence of malic acid, which is present in the state of acid malate of lime; and to sulpho-cyanic acid, which is a primary constituent in the state of sulpho-cyanogen, combined with calcium. It is to the presence of a certain quantity of this last acid in the *sulpho-sinapisine* of MM. Henry and Garot, that M. Pelouze attributes the acid nature of this substance, and the property it possesses of striking a red colour with the per-salts of iron; so that according to M. Pelouze, *sulpho-synapisine* cannot be an acid, nor contain any sulphur in its composition.

These results, announced in a very positive manner, determined MM. Henry and Garot to immediately repeat their experiments, which afforded the following results:

1. That there exists, in white mustard seed, a particular crystalline substance (sulpho-synapisine), formed by the elements of sulpho-cyanogen, and of an organic base, suitable for developing the volatile oil of mustard.

2. That this substance, mistaken in 1825 for an acid, is neutral, but capable, under the influence of certain acids, oxides and salts, of transforming itself wholly or partially into sulpho-cyanic acid, either free or combined, and into volatile oil of mustard.

3. That there does not exist any sulpho-cyanuret of lime in mustard seeds, as had been asserted by M. Pelouze, and that the sulpho-cyanic acid which he found in the products of the distillation with sulphuric acid, resulted from the action of the acid on the *sulpho-sinapisine* itself, and not from the decomposition of sulpho-cyanuret of lime, since it does not exist in them.

It is evident, that with every new research, science makes some progress, and that no one need flatter himself with having said all, for, with whatever patience an experimenter may be endowed, it is impossible for him to embrace the numerous details of so complex a subject. Pre-occupied in general by

some predominant idea, which renders him incapable of seizing such phenomena as present themselves confusedly, he only observes such as are in accordance with his own views. The utility of these re-examinations, and of changing the nature of the experiments is, that each becomes provided with new weapons, and gains by that means. As to ourselves, our preceding observations on the bitter almonds, led us to the present research, and we were anxious to make a comparative study of these two seeds. We wished, for example, to ascertain whether water is not an indispensable vehicle in the development of certain principles in both these seeds. We therefore first subjected the white mustard seed to the same treatment as the almonds; that is, water was not employed until after we had extracted all that alcohol or ether would take up. Accordingly, we took some powdered white mustard seed, from which the greater part of the fixed oil had been drawn by expression, and introduced it into a long, thick tube, drawn out at one end and closed with a glass stopper at the other. The tube was then filled with ether, and immediately closed. The apparatus was disposed in such a manner, that the ether could only run out very slowly. This menstruum acted on the oil with a sort of repulsive force; it chased the oil as it were before it, and that which ran off at first was oil nearly pure, and scarcely smelling of ether. The washing was continued until the liquid, which was mostly of a fine yellow colour, came off nearly colourless. The etherial solutions were mixed in a retort, and distilled from a water-bath; the oil obtained from the residue of this evaporation was found, to our great astonishment, to have a marked acridity. We say to our great astonishment, because the first portions of oil that run off had a very sweet taste. We noted this observation, to avail ourselves of it in another experiment, and continued the present as follows: we submitted on the one hand the residue exhausted by ether to a new washing with cold alcohol, and on the other, we tried to take up with cold alcohol the acrid principle contained in the oil extracted by ether.

A few hours were sufficient to obtain the products of this last experiment. The oil and alcohol were poured into a stoppered bottle, shaken for some moments, left to rest, the floating alcohol then poured off, and replaced by another portion; this operation was continued until the alcohol came off tasteless. The oil which remained, being deprived of the alcohol, by evaporation, with which it was impregnated, was altogether insipid. The first washings were of a greenish yellow colour; they strongly reddened litmus, and had an acrid and sharp taste, resembling that of horse-radish. All the alcohol was united and submitted to a slow evaporation, in a close apparatus. The residue was decanted into a long tube, that it might deposit some small drops of oil, which were separated by means of the evaporation.

The upper liquid was of a brownish, somewhat deep green colour; of a hepatic, but not pungent odour, and tasted like that of the first alcoholic washings. It is remarkable, that it possessed in a high degree the property considered as one of the strongest characteristics of *sulpho-sinapisine*, viz. that of striking a red colour with solutions of the per-salts of iron.

The alcoholic product furnished nothing of a like nature. After some days of rest, we discovered in it long, flat, needle-shaped and pearly crystals, which presented all the characters of one of the substances described in the first memoir of MM. Henry and Garot.

A small portion of this acrid tincture was evaporated in the open air, and an oily matter separated from it; but we did not remark any trace of crystals. Another more considerable portion was submitted to distillation, after having been supersaturated with potass in a very slight excess; the product of the distillation was neutral, inodorous, and did not exercise any influence on the solutions of the per-salts of iron, whilst the residue acquired this property in a manner more and more marked, as the evaporation advanced. We supersaturated the residue with nitric acid, evaporated it in a platina crucible,

and afterwards calcined it strongly. The product of the calcination was redissolved in distilled water, and being suitably essayed with salt of baryta, gave a great quantity of sulphate.

The distillation with alkali was undertaken in the hope of volatalizing its acrid principle, as in the case of tobacco. We thought we remarked, that a superabundance of potass added to this product, developed an odour of mustard; but this was probably owing to the excess of potass having reacted on the organic matter, and produced a small quantity of ammonia, which had served as a vehicle for the odour.

Presuming, from the observations of our predecessors, that the property of turning red with solutions of the per-salts of iron, was due to the hydro-sulpho-cyanic acid, we readily accounted for the effect produced by the potass, but we thought that ammonia, instead of retaining it like the potass, would facilitate its volatilization, and that it would contribute perhaps as well to a development of sinapic odour. In consequence, we distilled a mixture of ammonia and acrid tincture, but only obtained a liquid of a fresh ammoniacal odour, which, when saturated with nitric acid, did not turn in the least red with the per-salts of iron, whilst the residue in the retort preserved that property in a high degree.

If the sulpho-cyanic acid exists in this product, it must be in combination. In order to ascertain this point, we added some drops of sulphuric acid to a little of the acrid tincture; the mixture, when distilled, gave a product which strongly reddened with the per-salts of iron, but had not the peculiar sharp odour of sulpho-cyanic acid. This may have proceeded from our liquid having been too dilute, for it is difficult, after the researches of MM. Henry and Garot, and those of M. Pelouze, to doubt the existence of this acid in the products of mustard. Nevertheless, we may remark, that this last chemist may have been mistaken as to the odour of the product which he has obtained; in fact, M. Pelouze says, that after having precipitated a decoction of mustard seed with the acetate of lead, and treated the supernatant liquor with sulphuretted hy-

drogen, to remove the excess of lead, he afterwards added sulphuric acid to the liquor, and submitted the mixture to distillation. The product was a fluid of a sharp odour, approaching very near to that of acetic acid, and which possessed, besides, all the properties of the sulphuretted chyasic acid of Porsett. It is certain that in this case the acetic acid was derived from the acetate of lead, and was due to the mixture of the product, and that the sharp odour observed by M. Pelouze might easily be derived from it.

To assure ourselves if the sulpho-cyanic acid in our acrid tincture was combined with any inorganic base, we evaporated to dryness and calcined a certain portion of it, which did not leave any appreciable residue.

It is evident, then, from the preceding, that if the sulpho-cyanic acid exists in the acrid tincture, it must be in combination, if not with a base, at least with some organic product.

This first treatment by ether made known to us the presence of an acrid, fixed substance in the white mustard, which has not heretofore been mentioned. But it is not to be presumed that we have yet obtained it in its purest state. The alcohol which we were obliged to make use of to extract it, dissolved at the same time some fat oil, and it is very probable that this principle retained a little of it.

In hopes of obtaining it more pure, we had recourse to another mode of extraction, profiting by our observations on the successive action of ether. Accordingly, a new portion of the mass was treated with perfectly neutral ether, and we each morning removed from the apparatus the liquid which had run from it during the twenty-four hours, and distilled a part of it. We thus obtained a series of products, of which the acridity was constantly increasing, and which each time contained proportionably less of fat oil. But unfortunately the absolute quantity diminished more and more.

The first tinctures, which contained a great deal of fat oil, were of a fine citron yellow colour ; the last were of a greenish-yellow, nearly colourless.

The product of the evaporation of one of the last washings, the taste of which was caustically acrid, being redissolved in a small quantity of water, the mixture became milky: we submitted it to distillation, and after some minutes' boiling, tested with a per-salt of iron, by which neither the distilled product, which was inodorous, nor the aqueous residue, were in the least changed. The liquid was again carried to ebullition, which was continued for more than half an hour. The same tests were repeated, and the results were very nearly the same, although a slight tinge of red was observable in each of the two products.

This acrid substance, which had thus undergone a prolonged ebullition, was separated into two products, one yellow and fluid, which preserved much acrimony, the other brown and solid, not having any taste: both were inodorous, and yet the last developed a slight smell of hartshorn when rubbed between the fingers.

This mode of extraction is long and expensive, and we obtain, too, but a small quantity of the product; hence the difficulty of examining this new substance in its pure state. Still we think that the best means of obtaining it, would be to treat several times by alcohol the product of the evaporation of the last etherial tinctures. At each operation we would remove a small portion of the sweet oil, and would succeed without doubt in disengaging it altogether from the acrid principle. What seems to authorise us in this conclusion, is that the solubility of the product which we have obtained, was augmented by each new treatment, and also that we separated less oil from it by each successive one. We have always procured this acrid principle in the state of an unctuous red liquid, soluble in alcohol and ether, inodorous, and of a sharp taste, resembling that of horse-radish. It remains to be known whether it really pre-exists in white mustard seed.

The following experiments will throw some light on that question.

Some will, without doubt, have remarked, that in the first

treatment, the acrid principle separated from the fat oil extracted by ether, possessed the property of reddening strongly by the per-salts of iron, and which did not take place with the same acrid principle obtained directly from the etherial washing of the second mode of treatment.

To what are we to attribute this difference? It will be perhaps difficult for us to give at this time a very plausible explanation; nevertheless, we shall say that if this property of turning red with the per-salt of iron is characteristic of sinapisine, as MM. Henry and Garot think, we should be able to find this new and curious substance in all the products of white mustard seed which possess this property in a decided manner. But this is not the case; for our first acrid tincture, which reddened strongly, afforded no trace of crystalline matter, when allowed to evaporate spontaneously. This character of sinapisine is therefore accidental, and depends on a foreign substance. MM. Henry and Garot have shown that sinapisine was susceptible, under certain influences, of giving rise to sulpho-cyanic acid; and that acid has also for one of its characters, that of striking a red with the per-salts of iron. It may be presumed, then, that when sinapisine presents this property, the alteration has already commenced, and that to obtain it in its pure state, we must be able to preserve it from the influences which determine its decomposition.

Since our experiments on bitter almonds, we regarded water as the most efficient agent in modifying organic principles, and thought to prevent all alterations of this kind by the mode of treatment we then followed. We continued therefore to wash with alcohol the flour of mustard which had been drained from ether, and obtained a new series of tinctures or washings, the first of which was of a brownish red colour, though the last etherial washings had scarcely an amber tint; the alcoholic tinctures were all united and distilled at a moderate heat; the product of the distillation was pure alcohol, and the residue, which had acquired a reddish-brown colour, had become

slightly viscous, and had a distinct odour of yeast of beer. We poured it into a capsule, and after some hours cooling, it became solid by the crystallization of a substance, which assumed the form of small micaceous leaves. The whole was placed on a piece of cloth, and strongly pressed. The crystalline deposit was reduced to a very small volume, and was of a dull white. It was redissolved in boiling alcohol, in which it appeared to be quite soluble, and the liquid being set aside to cool, we saw it dispose itself into small white tufts of needle-shaped crystals, and the number of them increase to such a degree that the whole became a single mass. We threw them on a filter and washed them with a little cold alcohol.

This crystalline product, submitted to several essays, presented all the principal characters of sulpho-sinapisine, not excepting that of turning red with the per-salts of iron. Thus we might rest convinced that this last property was inherent to the sinapisine, were it not for the difference which we have remarked between the products of the first mode of treatment by ether, and those of the second. This anomaly, inexplicable as it was, determined us on making new efforts, as we had before intended, to obtain the sinapisine by other methods, and to see if, by varying the mode of treatment, we could not obtain it in another state. We attached the more importance to this research as we were very curious to ascertain whether sulphur was really one of the constituent parts of sinapisine, for it is, without doubt, one of the most singular and interesting results that organic analysis has afforded us for a long time. It was necessary then that it should be well proved. This time we treated the powdered mass directly with concentrated boiling alcohol, and thus obtained a tincture of a greenish-yellow, which became a little opaque by cooling, and struck a slight red colour with the per-salts of iron. Some hours afterwards, it was seen to deposit a crowd of yellowish-white radiated tufts on the sides of the vase. The next day they were separated from the liquid and washed with a little ether,

in order to separate the fatty matter with which they were impregnated.

One fact, which it is important to make known here, is, that after the first alcoholic treatment the powdered mustard had entirely lost its sharp taste, and what was more astonishing, neither the alcoholic solution, or the product of its evaporation, nor the crystals deposited, had any acrid taste. We shall return to this observation, which we think worthy of attention.

The crystals under consideration were redissolved in boiling alcohol, which did not act on them until after a continued ebullition, and required a much greater quantity of solvent than those obtained by treating with ether; we examined them, after having purified them, and found—

1. That when once dissolved in water they could not be reproduced by cooling, as the sinapisine of MM. Henry and Garot, and that by spontaneous evaporation there remained on the sides of the capsule a sort of varnish, of a transparent yellow, which detached itself in scales.

2. That they do not exercise any colouring influence on the per-salts of iron, but, like the sinapisine of MM. Henry and Garot, they give sulphuretted hydrogen when decomposed by heat, and sulphuric acid when treated by nitric acid. In fine, these crystals possess the other properties of ordinary sulphosinapisine; nevertheless, when treated by concentrated alkalies, they do not emit any of the sharp odour of mustard which MM. Henry and Garot have observed under the same circumstances, but only a very fresh odour of ammonia.

Thus we see that these two products, though very evidently the same, differ, notwithstanding, in some points. It was presumed that these differences must be owing to some change in their elementary composition. Ours, in fact, contains—

Carbon	54.000
Hydrogen	10.6512
Nitrogen	2.8392
Sulphur	9.3670
Oxygen	23.1426

That of MM. Henry and Garot is formed of

Carbon	57.920
Hydrogen	7.795
Nitrogen	4.940
Sulphur	9.657
Oxygen	19.688*

MM. Henry and Garot have remarked, that in their sinapisine, the nitrogen and sulphur are in very nearly the same proportions as in sulpho-cyanic acid. We see that in ours the quantity of nitrogen is too small. Could that be the property which would render the formation of sulpho-cyanic acid more difficult? We are ignorant of it, but it might be so, though this will not explain the variation in the composition of the matter itself. May not the nitrogen be accidental, and depend on some foreign matter? Perhaps future observations will prove this. In the mean time, what can we conclude from these singular anomalies if it is not that it is impossible to state any thing positively on the elementary composition of the products furnished to us by the analysis of organic substances, and that we cannot be certain of their existence until after having obtained the same by several different processes.

By comparing our results with those of MM. Henry and Garot, it may be seen that they agree in this point, viz. the property of turning red with the per-salts of iron does not prove the presence of sulpho-cyanuret of lime in the products which possess it, and that they differ in this, that the property is not, according to us, inherent to the sinapisine, nor do we think that it would be a consequence of its alteration. We would be more disposed to think with M. Pelouze, that it depends on the presence of a certain quantity of sulpho-cyanic acid, coming from an entirely different source. Still we must own that we have also some doubts as to this being the fact, since we have not been able in any case to develope the sharp odour which belongs to this acid.

* Results corrected by M. Pelouze.

We will cite here a remark which we have made, and which will, without doubt, find its application hereafter. We know that in our first treatment of the white mustard seed by ether, all our products would turn red, and that in the second, this would not take place. We have said that we were ignorant of the cause of this difference, as we did not think of its depending on a few atoms of acid contained in the first ether. It is certain, however, that, struck with the decided acidity of our products, we have supposed that it might be derived from the ether itself, and it was principally to assure ourselves of it, that we repeated the experiments, but with neutral ether, and not only have our products been neutral in this case, but they have not manifested the property of reddening with the per-salt of iron. It seemed from this that it must have been the acidity of the ether which had favoured the development of the principle which possessed the property of turning red, and it is also perhaps for this reason, that in treating a portion of powdered white mustard seed directly by alcohol, the product did not turn red, whilst it is altogether different if we treat it directly by water, as then this menstruum dissolves the acid contained in the mustard seed, which acid, by its reaction on the powder, favours, without doubt, the solution of this principle. One may see how important it is to know what these conjectures are worth, and we have already undertaken some new researches on this subject.

MM. Henry and Garot have remarked, that the elements of sinapisine might be so grouped as to represent those of sulpho-cyanogen and an organic matter susceptible of transforming itself into an essential oil; nothing is more gratifying to the mind than these speculative combinations, and this is a pleasure that may be readily enjoyed; a stroke of the pen is sufficient. But between the likelihood and the truth, the distance is often very great, and it requires nothing less than the whole power of the imagination to overcome it; but it is what we like to rest some of our difficulties on, though we must own that the hypothesis of MM. Henry and Garot

appears to us devoid of it. It may be remarked, that if we represent the sinapisine as formed of sulpho-cyanogen and a sort of base of an essential oil, we cannot see, since the cyanogen takes all the sulphur, whence the oil draws that which enters into its composition, and it contains a great quantity. There is, besides, another observation to make, viz. that if the sinapisine contains, as MM. Henry and Garot think, the radical of an essential oil, it must follow that the species of mustard which contains the most sinapisine, should also furnish the most essential oil, but it is precisely the contrary.

Our young colleagues have announced that in treating the sinapisine by the caustic alkalies with heat, it developed a fragrant odour of mustard. This experiment did not succeed with our sinapisine, and the acrid principle which we obtained from the powdered white mustard seed is not volatile. We say still that this powder diluted with water does not acquire any strong odour, and that distillation does not develope any more of it. Likewise, that the black mustard seed contains but little sinapisine, and white mustard no essential oil, nor any thing which appears susceptible of producing it. We have made many different experiments on this point, and may regard the result as certain.

Desirous also of knowing under what influences the volatile oil of mustard formed itself, and the causes which favoured or opposed its development, we have made some experiments, which we ask leave to add here.

We at first sought to prove whether the intervention of water was indispensable, and to arrive at it we treated a certain quantity of the marc of black mustard with boiling alcohol; that is to say, the powder deprived of the greater part of its fixed oil by expression; and we have seen that, as with the white mustard, the acrid principle disappeared by this treatment, without our being able to find a trace of it. We obtained for product, by the evaporation of the alcohol, only a viscous matter, which was sweet and inodorous, joined to a little bitterness, and very nearly soluble in water. The mustard that

had undergone this treatment had lost all its taste, and did not acquire any strength when diluted with water. Thus the mustard seeds act as do those of bitter almonds under similar circumstances.

We all know the lively and penetrating odour which the black mustard manifests when mixed with water, and it has been thought for a long time that the addition of a little acetic acid to the mixture gave it still more taste, though this result has been contradicted more recently. On the other side, some say that it is the influence of very volatile substances, and particularly that of ammonia, which favours the development of certain odours.

We have submitted the mustard to these influences, in order to see if there would not result some means of favouring the extraction of the volatile oil. In consequence we have made several mixtures of equal quantities of the powder and water; but for the first of these mixtures we used pure water, in the second we put a little acetic acid, in the third sulphuric acid, and in the fourth we dissolved a small quantity of subcarbonate of potass. Some seconds were sufficient to develope in the two first a most penetrating odour, while the other two remained absolutely inodorous; however, the alkaline mixture, while still fresh, had a slight smell of clover, afterwards it contracted a most fetid hepatic odour.

This contrast, on the development of the odour, is so decided, that it is somewhat surprising. How it is, that we find the odour destroyed in the two last mixtures, nothing has yet explained to us. In continuing our researches, we shall, perhaps, be more fortunate. All that we can remark at present is, that it is not probably as an acid that the sulphuric opposed the development of the essential oil, since the acetic acid has a directly opposite action to it, which results without doubt from its greater expansibility. We thought at first that this destruction of the odour might depend on the obstacle presented by the affinity of the potassa and sulphuric acid for water, preventing the emanation of vapour ; an indispensable vehicle for

odours. But by submitting similar mixtures to distillation, the results have been the same. It becomes then more probable that it is by forming some combinations, or by opposing the reunion of certain elements, that these two agents prevent the development of the odour.

Having only succeeded in finding means to retard the extraction of this volatile oil, we were obliged to have recourse to the ordinary method, and to limit ourselves to rendering the process more easy. The following is the plan we have followed :—We put into the body of an ordinary still, two kilogrammes of the pulverised mass, with five kilogrammes of luke warm water, closed the still immediately, and drew off the liquor by means of a moderate charcoal fire. We thus obtained nearly half a gros of the essential oil from a kilogramme of the mass.

The study of the properties of this essential oil has already been made the subject of an interesting memoir, for which we are indebted to one of our ancient colleagues, M. Thibierge. Nevertheless, we have submitted it to new tests, to see if it would present any analogy to the essential oil of bitter almonds, but we have found that it did not undergo any alteration by prolonged exposure to the air or in oxygen. Neither did it manifest at any time either an acid or an alkaline reaction; nor did the water which came over with it turn in the least red with the per-salts of iron.

We have not yet determined its boiling point.

This oil, put in contact with diluted sulphuric acid, and agitated for some moments in a tube, gave a lactescent liquid, from which the oil would separate but with difficulty.

A weak solution of caustic potass produced entirely a contrary effect; the oil united itself much more promptly than if it had been united with water only.

In the two last trials the oil preserved the whole strength of its odour, and this tends much to demonstrate the non-pre-existence of essential oil, for we see that these two agents, mixed directly with the powder of black mustard, oppose the

development of its odour. But if it was from their reaction on the essential oil, the same effect should be produced by mixing them together.

Concentrated nitric acid destroys the essential oil of mustard promptly, and with a strong disengagement of nitrous gas. The remaining liquid contains a great quantity of sulphuric acid.

This essence, agitated with water and a few globules of mercury, blackens at once, but preserves its lively and penetrating odour even after several days of contact. This mixture submitted to distillation, has reproduced the essential oil full as penetrating as before, which, treated by nitric acid, has likewise furnished much sulphuric acid.

This experiment was attempted with the idea that the mercury might perhaps separate the sulphur, especially if it was but accidental.

We have not had time to carry our researches further, but it is our intention to continue them, and to endeavour to determine in what state the sulphur is contained in this essence, and whether it does not constitute a species of hydro-sulphuret of carbon. It will be curious also to *examine* whether nitrogen is an essential part of it.

This last analysis has shown:

1. That the chemical composition of the white and black mustard seed is essentially different.

2. That the active principle of the white mustard seed resides in a fixed substance, which does not pre-exist in the seeds, and which is most likely derived from the sinapisine combined with some other product, for if this principle is once taken up, the acridity does not again show itself. Both contain sulphur, and very nearly in the same state.

3. That the active principle of black mustard seed is a volatile oil which does not pre-exist, and which is not developed without the aid of water.

4. That from all these circumstances, we are induced to think that there exists in these seeds a principle from which is

derived the sulphur contained in the volatile oil; this principle should be found in the alcoholic treatment, and we propose searching there for it.

5. That the sinapisine extracted by alcohol, without the previous intervention of water, does not possess the property of turning red with the per-salts of iron, nor of developing any odour with the caustic alkalies; that it is less soluble in alcohol, and contains less nitrogen than that obtained by the process of MM. Henry and Garot, but that sulphur is one of its principal elements, and that from this circumstance, it is certainly one of the most interesting substances of the organic kingdom.

ARTICLE L.—*On the Chloride of Iodine and its application to the preparation of a pure Iodic Acid. By M. J. Liebig.*

As iodic acid furnishes an important reagent in the verification of several vegetable bases, and as from trials made by myself, it is proved that the iodate of soda may be employed as a very good means of separating baryta from strontia, I have made repeated investigations on the preparation of these two compounds, with a view of discovering the best method of forming them, and I now present my observations on this subject, comparing them also with those of M. Serullas, as detailed in the *Annales de Chimie.*

There are, as is well known, two combinations of chlorine with iodine; one is brown and liquid, the other yellow and solid. This latter is only the liquid combination saturated with chlorine. Consequently, the former contains less chlorine; hence, it has been termed a chloride of iodine at the minimum

of chlorine; the other is designated as the chloride of iodine at the maximum. As this latter is soluble in water, the preparation of it is much facilitated by the following procedure:—On the iodine of commerce is to be poured from eight to ten times its weight of water; a current of chlorine is passed into this mixture until the whole of the iodine is dissolved, and absorbs no more of the gas. A yellowish brown fluid is thus obtained, which may be considered as a solution of hydrochloric and iodic acids, since the chloride of iodine is decomposed by water, and the chlorine combines with the hydrogen, and the iodine with the oxygen of this fluid.

We shall therefore in future consider the chloride of iodine in solution in water, as representing a mixture of hydrochloric and iodic acids. It now remains to prove by rigorous experiments, that iodic acid contains five atoms of oxygen. But, if by contact with water, the chloride of iodine is transformed into iodic and hydrochloric acids, it must be concluded that the chloride of iodine at a maximum contains five atoms of chlorine to one of iodine. This composition has generally been adopted since the recent experiments of Gay Lussac. But some experiments which I made, did not, by any means, give me this composition, and in fact, if it be true that the chloride of iodine at a maximum, is transformed by contact with water into hydrochloric and iodic acids, we should only obtain by saturating the watery solution by carbonate of potassa or soda, either chloride of potassium or the iodate of potassa or of soda. But it is remarked, that whenever this acid liquid is neutralised by one of these bases, that it is disposed to part with a notable portion of iodine, in the form of a blackish-brown or black powder. This fact evidently proves that in the solid chloride of iodine, there is more iodine than is requisite to form iodic acid.

I passed dry chlorine for a whole day through iodine equally dried, and was never able to obtain a combination which would remain perfectly clear when dissolved in water and saturated with potassa or soda; a large proportion of iodine always sepa-

rated from it. From the experiments it appears that the solid chloride of iodine must contain at least five atoms of chlorine, or in other words, it contains more iodine than is requisite to form iodic acid with the oxygen of the water which is set at liberty, when the chlorine combines with the hydrogen. Hence we may consider the solution of chloride of iodine in water as a mixture of the hydrochloric and iodic acids and iodine, or rather, of hydrochloric acid with an oxide as yet unknown, and of an iodous acid which is decomposed by the action of alkalies into iodine and iodic acid.

M. Serullas has discovered a very remarkable property in the chloride of iodine at a maximum; this is, that concentrated sulphuric acid precipitates it from its solution in the form of caseous flakes; but as we have seen above that the chloride of iodine is decomposed by water, it must here result, that under the influence of the sulphuric acid, the oxygen of the iodic acid combines with the hydrogen of the hydrochloric acid to again form water.

The chloride of iodine at a maximum possesses another interesting property; this is, that when moistened with water and afterwards sprinkled with alcohol, it is immediately decomposed, forming iodic and hydro-chloric acids. As the iodic acid is not soluble in alcohol, it separates in the form of a brown mass, whilst the supernatant alcohol holds the hydrochloric acid and iodine in solution; by repeated washings with alcohol, the iodic acid can be obtained in a dry form in white crystalline grains. M. Serullas proposes this plan for the preparation of iodic acid on account of its simplicity, but it gives less advantageous results than any of the others. We scarcely obtain a seventh of iodic acid for the iodine employed, consequently there is a loss of six-sevenths of iodine, besides the expense of the alcohol.

Iodate of Potassa. When a solution of chloride of iodine at a maximum is not fully saturated with carbonate of potassa, so that the fluid still remains acid, on cooling, there is a precipitation of a combination of chloride of potassium and acid

iodate of potassa, in the form of a crystalline white powder. This double salt, whose composition does not appear to be sufficiently determined, contains about twenty-two per cent of chloride of potassium, the rest is acid iodate of potassa, which is readily separated from the chloride of potassium, by pouring warm water on the double salt, and slowly evaporating the solution.

In twenty-four hours the acid iodate of potassa crystallizes in a pure state in the form of regular rhomboidal prisms with dihedral summits. One part of this salt is soluble in seventy-five parts of water at 60° F. With the neutral iodate of potassa, we can obtain a tri-iodate of potassa, by dissolving it in an excess of diluted sulphuric acid, and permitting the solution to cool slowly. This salt crystallizes in rhombs, and is much more soluble than the bi-iodate, for one part will dissolve in twenty-five parts of water. The bi-iodate forms, with an acid sulphate of the same base, a peculiar double salt, which may be obtained in a crystalline form by slowly evaporating the mother-waters of the preceding.

Iodate of Soda. M. Serullas obtained this salt in the form of a white precipitate, by imperfectly saturating a solution of chloride of iodine at a maximum with soda, and then adding alcohol to the liquid, washing the deposit with spirits of wine, then dissolving it in warm water; the neutral iodate of soda crystallizes in the form of large, transparent, octahedral prisms. If this plan be followed in the preparation of this salt, there will be a loss of about a third of the iodine, which remains in solution in the alcoholic liquor. The following affords a quantity of iodate of soda, corresponding exactly to the iodine employed.

A current of chlorine is to be passed through water holding iodine in suspension, until this fluid no longer absorbs any of the gas. A solution of carbonate of soda is then to be added. As soon as the liquid approaches saturation, a notable quantity of iodine is precipitated. A current of chlorine is again passed through the mixture until it becomes transparent, and after-

wards soda is to be added till perfect neutralization is produced. It is evident that the treatment with chlorine must be continued as long as any iodine separates. The liquid is to be evaporated about a tenth; whilst it is still warm, half its volume of alcohol is to be added, and it is then to be permitted to cool. The iodate of soda then crystallizes in the form of a saline mass, composed of octahedral prisms grouped in a stellated form, which are to be washed with a little spirit of wine to remove any hydrochlorate of soda which may be mixed with them.

If alcohol be added to the evaporated and cooled liquid, it changes it almost entirely into a mass of the consistence of pap, which renders the washings with spirit of wine both difficult and expensive. I have already mentioned that the iodate of soda offers an excellent method of separating baryta from strontia, solutions of the salts of strontia not being precipitated by the iodate of soda; whilst, on the contrary, this salt throws down a white flocculent deposit from those of the neutral salts of baryta; and this precipitation is so complete, that not a particle of baryta remains in solution.

Preparation of Iodic Acid. M. Serullas has indicated several methods for the preparation of this acid; it may be obtained by decomposing the iodate of soda by silico-fluoric acid, boiling till all the excess of acid is volatilized, and then filtering. The filtered fluid is then mixed with a certain quantity of pure fluoric acid, and the white precipitate, which again forms, is to be separated by the filter. The liquid is then evaporated to the consistence of a thin syrup, and left to spontaneous crystallization in a warm situation; in this operation the glass vessels used should be covered with a layer of wax, to protect them from the action of the fluoric acid.

Iodic acid may be procured by another mode. To a boiling solution of iodate of soda, is to be added at least double the quantity of sulphuric acid necessary to saturate the soda contained in the salt, and the whole slowly evaporated on a moderately warm sand bath; a crystalline mass will be obtained, which is to be washed with very little water, and dried between folds of blotting-paper.

I have obtained very regular crystals by dissolving, by heat, one part of iodate of soda in one part of sulphuric acid, previously diluted with its weight of water, and evaporating the solution on a sand bath. The crystals presented a very singular property: when placed on folds of blotting paper, just as they appeared to have become dry, they suddenly became fluid, and changed into a transparent mass, which was almost wholly absorbed by the paper. When put into a porcelain capsule they also became liquid on exposure to the air, but after a certain lapse of time the whole changed into a white but uncrystallised mass. It is very likely the crystals of iodic acid obtained by means of the sulphuric acid, are anhydrous, and become fluid by attracting moisture from the air, and again become solid after having absorbed the requisite quantity of water.

I have found the following procedure of my own to be at once simple and advantageous in its results. By the above indicated method, a solution of chloride of iodine at the maximum, saturated with chlorine, is to be formed, the solution is to be neutralised by carbonate of soda, using the precautions already stated when speaking of the iodate of soda; a solution of hydrochlorate of baryta is then to be added, till a precipitate no longer takes place. This precipitate is iodate of baryta, which is to be well washed with water on a filter and then dried. To nine parts of the dry precipitate is to be added two parts of sulphuric acid diluted with ten or twelve times its weight of water. This mixture is to be boiled for half an hour, and the sulphate of barytes separated from the diluted iodic acid by filtration; this latter is then to be evaporated to a slight syrupy consistence, and exposed to the air for a few days, when very regular and transparent crystals will form; the mother-water is to be decanted, and its spontaneous evaporation will afford another crop of crystals.

If we attempt to obtain the crystals by evaporating the iodic acid by aid of heat, a white mass will be the result, having no crystalline appearance. If the concentration be carried too

far, the residue will also be a white mass, which must be redissolved in a small quantity of water, and left to spontaneous evaporation, to give regular crystals.

If nitric or sulphuric acid be added to an aqueous solution of iodic acid, a crystalline white powder is precipitated, which has been regarded as a combination of these acids with iodic acid; but M. Serullas has found that this precipitate is pure iodic acid, which contains neither of the first mentioned acids in chemical combination. This precipitation of iodic acid is owing to its insolubility in nitric and sulphuric acid, as well as from these acids depriving it of its water of crystallization. I have also convinced myself by actual experiment of the non-existence of the pretended iodo-sulphuric and iodo-nitric acids.

Journal de Pharmacie, April 1832.

ARTICLE LI.—*Acidification of Iodine by means of Nitric Acid. By A. Connell, Esq. A.M.*

The methods which have been hitherto followed for the oxidation of iodine, with a view to the formation of iodic acid, may apparently be reduced to three; 1, The action of alkaline solutions giving rise to the formation of a hydriodate and an iodate, from the latter of which the iodic acid may be separated by the original mode of M. Gay-Lussac, and more perfectly by the recent process of M. Serullas; 2, The action of euchlorine, as suggested by Sir H. Davy; and 3, The action of water on the perchloride of iodine, and subsequent separation of iodic acid by means of alcohol, as also proposed by M. Serullas. The agency of nitric acid under certain management, offers another method, which I have been unable to observe noticed any where, and which, perhaps, will be found to equal, in facility of execution, any of the preceding.

This agency may be advantageously studied on the small scale. If a little iodine be boiled with a small quantity of nitric acid in a common test tube about five inches long, the iodine is dissolved and a red solution formed. If the liquid be now farther boiled, and the orifice of the tube kept slightly stopped with a piece of cork, the iodine sublimes and condenses on the sides of the tube. The iodine is then to be washed back again into the liquid by agitation; the liquid again boiled, and the sublimed iodine again washed back into the fluid, and this process continued until iodine no longer appears, and the liquid is colourless. If the boiling be then continued for a little, so as to increase the concentration of the liquid, it usually becomes milky, and if it be poured out and evaporated to dryness, a white mass is left, which is iodic acid, retaining a little nitric acid.

Having made these observations on the small scale, I proceeded to try the process with larger quantities of the materials, with a view to its employment as a method for the preparation of iodic acid. The vessel I used was a rather large and tall flask, having a narrow orifice. In one trial I used twenty-five grains of iodine and half an ounce of fuming nitric acid; and in another I employed twice these quantities of the materials. After introducing the iodine and acid into the flask, the liquid was made to boil. As soon as any iodine sublimed and condensed on the side of the vessel, it was washed back again into the liquid by agitation. After the process had been continued for some time, a precipitation of white crystalline grains was observed to take place, and the operation of boiling and washing back the sublimed iodine was continued until the free iodine had, to a great extent, disappeared. The whole was then decanted into a shallow basin and evaporated to dryness. Any free iodine which had remained was soon dissipated by the heat. The residue of the evaporation consisted of whitish crystalline grains, which were iodic acid, retaining a little nitric acid, from which they appeared to be freed by one or two solutions in water and re-evaporations, when they

lost much of their crystalline appearance, and became a whitish delinquent mass, occasionally with a slight purplish tint, from a tendency to decomposition by the heat of evaporation.

The general properties of the matter thus obtained, sufficiently identified it with iodic acid. Exposed to a sufficient heat, it was decomposed, and iodine sublimed. Its solution in water gave a precipitate with nitrate of silver, soluble in ammonia. Saturated with potash, it gave, by evaporation, a salt composed of grouped cubical crystals, deflagrating on hot charcoal.

The quantity of the acid obtained by this process of course must vary according to the care taken to prevent the dissipation and loss of iodine. Where no particular precautions were taken to prevent its loss in the state of vapour, and where the process was not continued until the entire disappearance of iodine, the quantity of acid obtained approached that of the iodine employed. In operating with the relative proportions of iodine and acid which I have mentioned, I have no doubt that a farther addition of iodine might be made to the liquid, after the acidification of what had been first introduced; and the process might then be farther continued, as before.

I find, conformably to the observation of M. Serullas, that iodic acid does not attack gold. Its solution seems to have no action on that metal, even when aided by heat. It is equally inert in regard to platinum. Zinc is at first attacked by it with effervescence, especially when diluted; but the action ceases almost immediately, apparently from the formation of a sparingly soluble iodate, and when more zinc is added, the liquid becomes milky. No effervescence ensued when iron filings were thrown into the solution of iodic acid, whether concentrated or diluted; but when the liquid was boiled, a white powder precipitated.

A solution of the acid reddened litmus paper permanently. The permanency of the colour may possibly be owing to a trace of nitric acid still adhering, as according to Davy, the acid ultimately bleaches vegetable blues.—*Edin. New Philos. Journ.*

ARTICLE LII.—*Quantity of Extract furnished by different varieties of Sarsaparilla. By M. Thubeuf.*

[In Vol. III, p. 46, of this Journal, we gave the first paper of M. Thubeuf on this subject; the following is a continuation of his experiments on some other varieties. These additional experiments are the more interesting, from our market being supplied with large quantities of sarsaparilla from Vera Cruz and the Caraccas.]

The red or Jamaica sarsaparilla furnished me with the greatest quantity of extract; another red sarsaparilla, called sarsaparilla from the coast, which I have since met with, though differing from the preceding in its external characters, has afforded me a product similar in appearance and quantity. The Vera Cruz sarsaparilla, which is but little esteemed, if we are to judge from its scarcity, should, nevertheless, be classed next to the red varieties, from the quantity of extract it affords. This, although less bitter than that obtained from those varieties, is as much so as that from the Honduras. The Caraccas sarsaparilla, which I have also examined, gives rather more extract than the Honduras; the taste of its extract is much weaker than that of any of the others, with the exception of the Portuguese variety.

Red Sarsaparilla from the Coast.

Six pounds afforded,		
1. Maceration in water	ʒxij	ʒvj
2. Maceration in alcohol at 22°	ʒiij	ʒvj
3. Maceration in alcohol at 22° followed by a slight digestion	ʒiij	
4. Maceration in alcohol at 22°		ʒvij
5. Maceration in water		ʒvij
	ʒxxi	ʒij

Sarsaparilla from Vera Cruz.

Six pounds afforded,			
1st operation		ʒxij	
2d	do.	ʒiij	ʒvijss
3d	do.	ʒij	ʒij
4th	do.		ʒvijss
5th	do.		ʒvj
		ʒxvij	ʒvij

Caraccas Sarsaparilla.

Six pounds afforded,			
1st operation		ʒix	ʒiij
2d	do.	ʒij	ʒij
3d	do.	ʒij	
4th	do.		ʒvj
5th	do.	ʒi	
		ʒxv	ʒiij

Journal de Pharm.

MISCELLANY.

Manufacture of vinegar from grain.—M. Dubrunfaut gives the following economical process for this. The grain employed in this manufacture is a mixture of one part malt with four parts rye, ground in the same manner as for brewing or distillation. In this state the corn is macerated in about six or eight times its weight of water as in the distilling process. The soaking, fermentation, &c. is all conducted as in the making of alcohol. In fact, the result of this part of the operation is to make a spirituous liquor.

When the fermentation has subsided, which takes place in a few days, the mass is strained, and the residuum is distilled; the product of this distillation is added to the clear liquid, and the whole placed in a heated room to undergo the acetous fermentation. This room contains barrels placed on tressels; these barrels are to be a half or three-fourths filled with liquid. To create an action, one fifth to one fourth of good vinegar is to be added, and some of the mother which always forms in vinegar casks.

The room should be kept at a constant temperature of 100° to 110° F. Every day the greater portion of the contents of each vessel is to be drawn off and transferred to another. To accomplish this, an empty cask is used to receive the contents of the first barrel. This operation, by agitating and airing the liquid, aids the formation of the vinegar, and should be repeated several times a day.

By the above process, the vinegar is fully developed in a month or six weeks, and if it has been well conducted, half the quantity contained in each vessel is to be drawn off into small casks, and placed in a cool room or cellar, where the clarification is to be performed; this is best effected by passing the fluid through beech shavings. The vacuum produced in each cask by this reduction, is to be filled with another portion of the alcholised liquid, equal in volume to the vinegar that has been drawn off.—*Agricult. Manufacturier.*

Lactic acid.—Berzelius gives the following methods of obtaining pure lactic acid. The acid alcoholic extract obtained from milk or meat is to be dissolved in strong alcohol, and mixed with a strong alcoholic solution of tartaric acid, as long as any precipitate falls; after being left at rest for twenty-four hours in a cool place, the double tartrate separates. The solution being evaporated, the extract is to be dissolved in water, and finely powdered carbonate of lead added as long as any of it is dissolved, and till the solution acquires a sweet taste, it is then to be acted upon by

animal charcoal, and afterwards by sulphuretted hydrogen to remove the lead. The liquid is to be evaporated, to expel the sulphuretted hydrogen, and mixed with recently prepared hydrated protoxide of tin, with which it is to be left in contact for several days, occasionally stirring it. The sublactate of tin is formed, which is to be well washed, and decomposed by sulphuretted hydrogen. This will give a very pure acid. The other plan is to saturate the acid alcoholic extract with carbonate of potassa or soda, evaporate, and heat the product in a sand bath till it fuses, becomes brown, and evolves the odour of urine, and ultimately of herring or roast meat; dissolve in water, destroy the colour by means of animal charcoal, filter, evaporate to dryness, dissolve in alcohol, decompose by tartaric acid; remove the excess of tartaric acid by carbonate of lead; precipitate the lead by sulphuretted hydrogen and evaporate. This gives a less pure acid than the former.

Lactic acid is colourless, inodorous, but has a sharp taste. When evaporated at 212° F. it becomes so thick as to flow with difficulty. It attracts moisture from the atmosphere. When strongly heated, it becomes brown, slightly boils, disengages a suffocating odour like that of heated oxalic acid, blackens, swells, and finally leaves a bulky charcoal. It dissolves readily in alcohol, but less so in ether.

Many of its salts are uncrystallisable or gummy; those of potassa, ammonia, magnesia and zinc, however, are crystallisable. They are soluble in alcohol, though with difficulty, especially if there be an excess of base.—*Ann. de Chim.*

Oxide of iodine.—M. Sementini gives the following method of obtaining this substance. A bladder filled with oxygen is to be attached to a brass tube, the other extremity of which terminates in a fine point, and is to be luted to a glass receiver. The whole apparatus, that is, the tube and receiver, are to be heated by means of spirit lamps. The whole being thus disposed, a globular mass of iodine is to be introduced into the receiver close to the capillary opening of the tube, and a stream of oxygen directed on it, by compressing the bladder; the combination takes place, and an oily liquid of an amber colour, condenses on the sides of the receiver; this is the oxide of iodine. This may also be obtained, and in still larger quantities, by triturating together the deutoxide of barium with such an excess of iodine as will give the mixture a blackish colour. This mixture is then introduced into a long-beaked retort, which is to be heated with a spirit lamp. By this means, the oxide of iodine forms, volatilises and condenses in drops in the neck of the retort. If these constituents be employed in a perfectly dry state, the oxide of iodine will present the following properties. Oily consistence, amber colour, soluble in water and alcohol, colouring litmus paper of an emerald green, a property which we attribute to a union of the blue of the litmus with the yellow colour of the oxide; at every temperature, the combustible bodies separate the iodine. In its state of concentration, a scrap of paper is sufficient to effect this; a disengagement of oxygen takes place, whilst the paper becomes coated with iodine.—*Journ. de Chim. Med.*

Colouring matter of lichens.—Dr Heeren has lately instituted a course of experiments on the colouring matter of the lichens of Sweden, which are used in Holland for the manufacture of orchil and litmus (*Canora tartarea* and *Roccella tinctoria*). He has succeeded in isolating this matter which he has termed *Erythrine*. It approaches the resins in its physical and chemical characters, but is distinguished by its solubility in boiling water; this on cooling, and more especially if it contains any

free acid, permits the erythrine to precipitate in the form of a fine crystalline powder. It is colourless, inodorous, and insipid; the alkalies readily dissolve it; heated with them, and more especially with ammonia, in a close vessel, it changes into *bitter of erythrine*, but heated with these bodies exposed to the action of the air, it absorbs oxygen and passes into the state of orchil red, whilst at the same time various other substances are formed. Orchil red, when placed in contact with animal substances in a state of putrefaction, is converted into litmus, which is perfectly pure, having a deep violet colour, the blue of that of commerce arising from the presence of a small quantity of potash. In the course of his experiments, Dr H. also discovered a vegetable acid hitherto unknown to him, which he has called the *Roccellic*. The properties of this acid resemble those of the margaric and stearic. —*Bull. Sc. Phys. and Memor. Encyclop.*

Paste for whitening the hands.—This is one of the best compositions of the kind. It is made as follows, clean bitter almonds, 12 ounces; rice flour, 7 ounces; bean flour, 3 ounces; finely powdered orris root, 1 ounce; carbonate of potash in fine powder, 4 drachms; essence of jasmine, 3 ounces; oil of Rhodium, 2 drops; oil of Neroli, 1 drop. The almonds are to be deprived of their skin by means of hot water, then washed in cold water, pounded in a marble mortar with a wooden pestle, adding a small quantity of water, to prevent the oil from separating; when the almonds are reduced into an homogeneous paste, the rice and bean flour and orris root are to be gradually added. The whole is to be well triturated, when the carbonate of potash previously dissolved in a little rose water is to be added, and the whole well mixed, after which the essence of jasmine and the essential oils are to be gradually incorporated with the mass, and the trituration continued for some time. If the liquid above ordered is not sufficient to form a paste of good consistence, a proper quantity of rose water is to be added. This compound is to be kept in covered vessels.—*Memorial Encyclop.*

Camphor and camphoric acid.—M. Liebig has given the result of an examination of camphor which throws additional light on the nature of this curious substance. Taking the mean of two analyses, he found it to consist of

Hydrogen,	9.702
Oxygen,	8.535
Carbon,	81.763
	100.000

According to Bouillon Lagrange, the camphorates of soda, potassa and baryta, are so little soluble in water, that one part requires from 200 to 300 parts for solution, whilst, on the contrary, Brandes states that they are deliquescent. According to Liebig, these differences depend on the camphoric acid on which the experiments were made.

When camphor is treated with concentrated nitric acid, a yellow liquid is formed; by long continued digestion, there is obtained on cooling a large quantity of white, opaque crystals, which, when boiled in water, give out a smell of camphor. These crystals are the camphoric acid of Lagrange, which gives insoluble or slightly soluble salts with all bases. They are a chemical compound of camphor and camphoric acid, and may be also formed by dissolving camphor in camphoric acid melted at a very low heat.

If this substance be treated a second time with concentrated nitric acid, more transparent crystals of camphoric acid are obtained, which afford the salts described by Brandes; when a boiling solution of this camphoric acid was poured into one of acetate of lead, camphorate of lead was formed; 100 parts of which gave 67.7 of sulphate of lead; analysis, however, renders it probable that the camphoric acid still retained some camphor in combination; it was therefore again treated with nitric acid, and the action continued until no smell of camphor was perceptible when the acid was boiled in water; 1105 parts of camphorate of lead gave 760 of sulphate. By analysis it yielded,

Hydrogen,	6.981
Oxygen,	36.852
Carbon,	56.167
	100.000

Ann. de Chim.

Crystallization of the alkaline metals.—M. Bequerel has been enabled, by very simple means, to effect the crystallization of the metals of the earthy oxides, as zirconium, magnesium, glucinium, &c. The apparatus he makes use of is very simple, it consists of two tubes of about one third of an inch in diameter, open at both ends, the lower extremity of which is to be filled with moistened clay; into one tube is to be introduced a solution of the chloride of one of these metals, and into the other an alkaline chloride. The tubes are then plunged about half their length into a vessel of pure water, and a platina wire introduced into the tube containing the solution of the metallic chloride as the salt of zirconium, for instance, and communicating with the negative wire of a galvanic pile; the same is to be done with the other tube, except that the platina is to communicate with the positive wire. This pile should not be composed of more than six elements, and the object may be attained, though more slowly, even with a less number. In twenty-four hours the negative platina wire will be covered with a brilliant steel grey layer, consisting of pure zirconium, the crystals of which acquire some size in a few days. Certain precautions must be taken to preserve this zirconium, as in less than six hours it inflames, and is converted into zircon. It must be dried in vacuo and preserved in petroleum. Glucinium and magnesium may be obtained by the same process, but the latter is so inflammable, that it is with great difficulty prevented from decomposing. M. B., by applying the same process to the oxide of iron, obtained, after a considerable lapse of time, pure crystallized iron, which was magnetic.—*Memor. Encyclop.*

Pectoral jelly of dog's grass (*Triticum repens*).—The following preparation is spoken of in the highest terms as alleviating the irritation of the throat in coughs. Root of dog's grass, well cleaned and cut into small pieces, 3 pounds; mallow and comfrey roots, each half a pound; polygala and seneka, 10 ounces; sound apples, 10; poppy heads, 10. Boil the whole in about a gallon of water down to one half; remove it from the fire, express the fluid, filter and add a pound of refined sugar for each pound of the fluid; clarify and evaporate to a properconsistence; just before removing it from the fire, add half an ounce or an ounce of orange-flower water. This jelly is to be kept in covered vessels. Five or six spoonfuls of it taken during the twenty-four hours will oftentimes calm the most obstinate cough. It can be coloured with saffron or cochineal.—*Memor. Encyclop.*

Red Lead.—It is well known that there are two well marked oxides of lead, the protoxide, yellow oxide or massicot, and the peroxide or brown oxide. Red lead is a third oxide intermediate between the preceding; its nature, which had apparently been well established by the experiments of Berzelius, has lately given rise to controversy. The following are the results of the experiments of Dumas on the subject. The common red lead is always a mixture of the protoxide and real minium. The following shows the quantity of oxygen given out by different miniums on calcination.

100 parts subjected to	1	heat afforded 1.17
do.	2	1.22
do.	3	1.36
do.	4	1.50
do.	5	1.55
do.	8	1.75
do. of orange mineral		2.23
do. purified minium		2.33

Hence it appears, that however long the calcination of the yellow oxide be continued, this substance can never absorb as much oxygen as does the finely divided oxide, which results from the decomposition of white lead, and is used in the formation of orange mineral. M. Dumas also thinks that, chemically, pure minium can be obtained, 1st, by heating orange mineral for a long time in contact with oxygen gas; 2d, by removing the protoxide, mixed with common red lead, by means of the neutral acetate of lead; 3d, by using in like manner a solution of potassa. These three methods furnish an analogous result; and the oxide may be considered as composed of

Protoxide of lead,	2 atoms
Peroxide of lead,	1 atom.

Memor. Encyclop.

Cinchona.—M. Payen communicated some observations of M. Cochet on Peruvian barks. The trees which afford this bark do not flourish well, except in elevated situations, and on the sides of sheltered ravines. Their culture requires a sort of hot-bed formed of leaves, and of two or three feet in thickness. These trees are of very slow growth, and those from which the bark is stripped are of a great age. The bark is procured during the rainy season (October to April). At this time the trees are covered with beautiful white flowers, by which they are easily recognized. They are cut down and the bark taken from the trunks only. The wood contains a very sweet juice, which serves for drink for the labourers employed. The wood is very hard, and might be useful in the arts, were it possible to transport it from the almost inaccessible spots in which the trees grow.—*Bull. Soc. Philom.*

New acid in the cherry laurel.—M. Peretti has discovered that the essential oil of cherry laurel contains, besides hydrocyanic acid, another acid which is crystallizable and appears different from any hitherto discovered in vegetables. Crystals were formed in this oil, which M. Peretti at first thought were camphor, but having distilled a large quantity of the leaves to obtain laurel water and the essential oil, he found many brilliant crystals in the form of acute prisms; after having

been dried on blotting paper, they were dissolved in alcohol, and water added to the solution, which caused the separation of a great quantity of white and acid flakes, susceptible of dissolving in ammonia. These crystals had an acid taste, and a faint smell of bitter almonds.—*Giorn. Arcad. and Memor. Encyclop.*

Hydro-chloride of carbon (*chloric ether*).—According to M. Morin of Geneva, this compound consists of

Carbon,	38.4	nearly equivalent to 4 atoms.
Hydrogen,	4.8	3
Chlorine	56.8	1
	100.00	

M. Dumas remarks, that these results differ materially from those of other chemists. MM. Robiquet and Colon, first proved that it consisted entirely of carbon, hydrogen and chlorine, and shortly afterwards, M. Gay Lussac determined its specific gravity, which he found to be perfectly analogous to the sum of the densities of chlorine and bi-carburetted hydrogen; and therefore concluded it to be a compound of equal volumes of those gasses. This was confirmed by the analysis of M. Despretz, and M. Dumas finds this to be its true composition, or

Carbon,	24.6	nearly equal to 2 atoms.
Hydrogen	4.1	2
Chlorine	71.3	1
	100.00	

Ann. de Chim. et de Phys.

Purification of mucilaginous solutions.—M. Guerin gives the following method for purifying mucilaginous solutions. The gum is to be dissolved in rain water, and a current of chlorine passed through the solution, until any brown colour it may have is destroyed. After this is accomplished, the fluid is treated to drive off the chlorine in solution, when a perfectly colourless mucilage will be obtained, which does not contain the smallest quantity of chlorine capable of being injurious in any process in the arts, in which mucilages are employed.—*Memor. Encyclop.*

Tooth-brushes.—One of the best tooth-brushes for persons with tender gums is what is known in France by the name of *brosse de corail.* This is nothing more than the root of the lucerne grass (*Medicago sativa, L*). These roots are carefully dried, deprived of their bark, and exposed to a gentle heat. When perfectly dry they are cut into pieces of about three inches in length, and one of the ends beaten gently with a hammer; this separates the fibres and forms a kind of brush of them. They are then placed for a day or two in alcohol coloured with alcanet. When taken out they are again dried and polished with an ivory burnisher.—*Journ. de Conn. Usuel.*

Preservation of iron from rust.—M. Zeni has invented a varnish for this purpose, which has proved fully competent to effect this result. Eighty parts of pounded brick are to be passed through a fine sieve and mixed with twenty parts of litharge; the whole is then rubbed up with a muller with linseed oil, to the consistence of a

thick paint, which may be diluted with spirits of turpentine where applied. Before the iron is coated with this preparation, it should be well cleaned. From an experience of two years, upon iron exposed to the air, and watered daily with salt water, after having been covered with two coats of this varnish, it was thoroughly proved that it answered the desired end.—*Bull. d' Encouragement.*

Liniment for chillblains.—R.

Chicken fat purified, or axunge,	aa	oz. xij.
Oil of sweet almonds,		
Yellow wax,		oz. iv.

Melt together by a gentle heat, pour into a heated mortar, and when nearly cold add

Oil of lavender,	oz. iij.
Aqua ammonia,	*f* oz. j.
Camphor, dissolved in	oz. j.
Tinc. Sinap. Nig	oz. ij.

The volatile oil is to be mixed with the ammonia, the tincture added to this mixture, and the whole then poured on the fatty mass in the mortar and well triturated. This liniment it is said will cure the worst chillblains if they have not ulcerated. It is to be rubbed on the inflamed part before a brisk fire.—*Journ. de Chim. Med.*

Wax from the buds of the poplar.—An extensive land owner in Flanders is said to have succeeded in obtaining a quantity of wax, by putting the buds of the poplar tree into bags, and submitting them to pressure. The wax is of good quality and has an agreeable perfume.—*Repert. Pat. Invent.*

Preservation of milk.—M. Dirchoff gives the following plan for keeping milk for an indefinite space of time. New milk is to be slowly evaporated over a gentle fire, until it is reduced to a dry powder. This powder is then put into a bottle hermetically sealed. When the milk is wanted for use, it is only requisite to dissolve a portion in water, and the solution will have all the qualities as well as taste of milk.—*Ibid.*

Box-wood a substitute for hops.—M. Du Petit Thouars, lately stated to the Philomathic Society of Paris, that more box-wood than hops was employed in making almost all the beer brewed in Paris. Box-wood contains a powerful soporific principle, with a bitter taste, which has received the name of buxinia.—*Repert. Pat. Invent.*

Defence against flies.—Oil of laurel has for a long time been employed with perfect success by the butchers of Geneva, to prevent flies from approaching their meat. This substance has also been used to guard the gilt frames of mirrors and pictures against the dirt caused by these insects.—*Recueil Industriel.*

Compound of alcohol and chlorine.—M. Liebig states, that if chlorine be passed through absolute alcohol, the latter is wholly converted into a white crystalline mass. This substance is a hydrate of a new combination formed of chlorine, carbon

and oxygen, and is termed *choral* by M. Liebig. When it is deprived of water, it assumes the form of a liquid heavier than that fluid and unites with it, and after some time changes into a white powder, which is insoluble in water. The anhydrous alkalies do not decompose it, but with the addition of water it is converted into formic acid and a new chloride of carbon, analogous to that produced by distilling alcohol over chloride of lime. By the action of chlorine on ether and pyroacetic spirit, compounds analogous to choral are formed.—*Ann. de Chim.*

Preservation against rust, &c.—A piece of linen or cotton cloth, steeped in a saturated solution of lime or sulphate of soda, and carefully dried, preserves from humidity and oxidation, delicate steel instruments, as well as parchment and paper. Steel instruments may likewise be preserved in quicklime. A magnetic needle suspended by a silk thread in lime-water, undergoes no deterioration.—*Journ. de Connois Usuell and Silliman's Journ.*

Cement for glass, porcelain, &c.—Take half a pound of the curd of skimmed milk, wash it until the water comes away limpid, press out all the water, mix the curd with the whites of six eggs, and when well incorporated, add the expressed juice of fifteen cloves of garlic, triturate the whole thoroughly in a mortar, then add gradually a sufficient quantity of dry and sifted quicklime to form a dry paste, and continue the trituration. To use this mastic, rub a small portion of it with a little water, on a piece of glass with a muller; when of a proper consistence, apply it to the fragment to be mended, or the crack to be filled; bind the parts together and let it dry in the shade. This will resist fire and boiling water. This mixture pulverised and mixed with an equal quantity of quicklime, may be kept for a long time in a well stopped phial.—*Idem.*

Indelible ink.—Nitrate of silver, 1 drachm; printer's ink, 1 ounce; triturate together in a glass mortar. A small portion, put by means of a ball on types, and thus stamped on linen or muslin, will give a very permanent impression.—*Ibid.*

New principle in cinchona.—M. Van Mons has discovered a new principle in the bark of the *Cinchona montana*, which is white, crystallisable and extremely bitter. The discoverer calls it *montanine*, and says that he has cured intermittent fevers in three days with it, in doses of two grains a day.—*Am. Journ. Med. Sciences.*

Naphthaline.—M. Laurent has obtained this substance from coal tar, by the following process. The coal tar is to be distilled, and a current of chlorine passed through the product for three or four days, thus producing hydrochloric acid, which acts on the oily matters and renders them more fluid; after being redistilled, the naphthaline precipitates at a temperature of 8° or 10° below zero; the fluid oil is to be expressed, and the naphthaline purified by cold alcohol. By dissolving it in boiling alcohol, it may be obtained still whiter and purer, and if it be afterwards sublimed, it assumes the form of brilliant white pearly laminæ. It will preserve potassium unaltered. It acts on various bodies like alcohol, and burns with a luminous white flame. *Journ. de Chim. Med.*